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The Public Lighting Tables of the American Meter Company will be found in the page advertisement of that Company.

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[OFFICIAL NOTICE.]

Where to Find the Western Gas Association's Exhibit, and the Custodian Thereof, at the World's Fair.

To the Fraternity: The exhibit of the Western Gas Association, at the World's Fair, St. Louis, is located in Section 33A, Liberal Arts Building, where Mr. Fred. R Persons, who is in charge of the same, will always be on hand to receive visitors and to explain anything that requires explaining.

[NOTICE.]

Twelfth Annual Meeting, Michigan Gas Association.

JACKSON GAS COMPANY,
JACKSON, MICH., July 20, 1904.

To the Members of the Michigan Gas Association: Preparations for the meeting of the Michigan Gas Association, to be held in Jackson, September 21st and 22d, 1904, are now well underway. The following papers are promised definitely:

"Retort House Practice in a Small Works," by Mr. George C. Turner, Secretary Coldwater (Mich.) Gas Light and Fuel Company.

"Temperatures as Applied to the Production and Purification of Coal Gas," by Mr. V. F. Dewey, Asst. Supt., Detroit City Gas Company.

"Commercial Lighting," by Mr. R. Schacklette, Manager Adrian (Mich.) Gas Company.

Also, a most interesting report on "Naphthaline," by Messrs. White and Ball.

In this connection let me call your attention to the "Question Box," with its special feature known as the "Trouble Box," which is in charge of Mr. E. F. Lloyd. Every member can help make this special feature a success by sending to Mr. Lloyd good, live questions or by relating their experience, or by asking help on the troubles they have had during the past year. If you have no questions to ask, no new experiences during the past year, and have encountered no troubles, this "Question Box" cannot help you. If the contrary is true, write to Mr. Lloyd, and *do it now.* Remember, all these things will be referred to some member for investigation, all of which takes time, and you should be as prompt as possible in communicating with Mr. Lloyd.

Don't forget to bring an application for membership from some fellow not now in the fold, and *be sure to attend the meeting yourself.*

Wishing that I will have the pleasure of welcoming you in Jackson,

Yours very truly, S. E. WOLFF, President.

[OFFICIAL NOTICE.]

Wrinkle Department, Western Gas Association.

OFFICE OF EDITOR WRINKLE DEPARTMENT,
ST. LOUIS, MO., July 25, 1904.

To the Members of the Western Gas Association: We again invite contributions to the Wrinkle Department of the Western Gas Association for the meeting of 1905. The Editor wishes to call the attention of the members of the Western Gas Association, and of the gas fraternity at large, to the fact that the "Western" has done good work in this de-

partment in the past; that its Wrinkles have been of value to many, and that it proposes to continue the good work.

The Editor further wishes to suggest that an earnest effort be made to improve the quality of the Wrinkles submitted, as a great many of the devices, while of undoubted practical value, are such as any gas works' foreman should know. We desire the Wrinkles which have a greater bearing on the scientific and technical portion of our business. Of course, there will always be room for the little, handy, practical devices, which so often help us over the rough places. We will gladly receive them, but we should all aim to place the gas business on a par with other scientific and engineering enterprises which are practically in a basis of exact knowledge and high efficiency.

To that end, therefore, we desire to secure a large collection of Wrinkles for the 1905 meeting. Give us the benefit of the mathematical, chemical, thermal and other devices which have helped you in designing or improving your plants; do not hesitate to send in the practical devices which are not on record so far; submit the ideas which have made the business end a success; and, finally, let every individual contribute his portion, so that the result may be worthy the achievements of the past, and a credit to the Western Gas Association.

The following wrinkle is submitted as a sample to guide others somewhat in working out their contributions to this department. This describes a method of regulating the pressure on the outlet of a holder in proportion to the rate of sendout, and was contributed by the writer to another Association some time ago.

"The essential idea of street pressure regulation is to maintain a certain pressure at the consumers' meters within a small percentage either way of the fixed pressure. As the consumption increases or decreases, the holder pressure should be raised or lowered. This is usually done by having recording pressure gauges located in the district supplied by the holder, and raising or lowering the holder pressure until the best average for the district is reached.

"Now, it is, of course, true that the same conditions of consumption never obtain on successive days or months, and, therefore, the following automatic indicator was suggested by the writer: In the outlet pipe of the holder we place a Pitot tube facing the holder. Naturally, the opening from the Pitot tube which faces the stream of flowing gas gives the pressure due to the sum of the static head plus the impact or velocity head, whereas the side openings give the pressure due to the static head only. Therefore, any variation in the rate of flow of the gas is at once indicated by the variation in differential pressure from the two openings of the Pitot tube.

"By using a very sensitive differential pressure gauge, we can thus observe this variable rate of flow. It is, of course, necessary to calibrate the instrument for each holder to be able to tell what pressures to carry on the outlet pipe for each division on the sensitive differential gauge, and it would probably be well to check this three or four times during the year. The Laclede Gas Light Company has so far secured three satisfactory types of extremely sensitive differential pressure gauges, and we have arranged them with two scales, one of which shows the divisions in millimeters and the other gives the proper pressures to be carried on the holder outlet opposite the indicator on the gauge. The writer purposely refrains from adding drawings or too much detail to the above description, as he merely wishes to submit one idea, which he hopes will suggest many others to help swell the contributions."

We must start the work at once; therefore, please send your ideas to the Editor, 716 Locust street, St. Louis, Mo., and oblige, Yours truly,

W. A. BAEHR, Editor Wrinkle Department.

BRIEFLY TOLD.

SUTTON'S "VOLUMETRIC ANALYSIS," ETC.—Through the attention of the publishers (Messrs. P. Blakiston's Son & Co., of Philadelphia) we are in possession of a copy of the ninth edition of Mr. Francis Sutton's excellent work, entitled, "A Systematic Handbook of Volumetric Analysis; or the Quantitative Estimation of Chemical Substances by Measure, Applied to Liquids, Solids and Gases." The prior editions of this sterling work have made its merits so widely and well known that explanation thereof is here quite unnecessary. So it is sufficient to say that the ninth edition simply brings the book up to evenness with current practice. Everyone who has to do with the chemistry of gas making should have a copy of Mr. Sutton's most useful work.

NOTES—

WHAT might have been a very serious fire on the storage plant of the Consolidated Gas Company, at 111th street, between First and Second avenues, this city, the evening of the 13th inst., was, by the prompt action of the fire department, speedily drowned out. The fire was occasioned by the ignition of oily matters that covered the seal water in the tank of holder. The newspaper accounts of it say that one time a circle of flame, 180 feet in height, encircled the holder, which was fully inflated. The damage done was inconsiderable.

A CORRESPONDENT in Chicago, writing under date of the 12th inst., incloses the following: "Henry Keck's heroism in making his fatal leap into a trench at 18th street and Armour avenue, Chicago, to save the life of policeman O'Brien about a week ago, has not been forgotten by the Peoples Gas Light and Coke Company. The Company, through its Vice-President, Mr. C. K. Wooster, has decided to appropriate $1,000 for the benefit of Heck's widow and children, who live at 2106 La Salle street. Three workmen were repairing a leak in a main when they were overcome by gas. Two reached the surface in safety, but the third was unconscious. Policeman O'Brien rescued the latter, but was himself overcome. Keck happening along jumped into the trench and put O'Brien on the surface, then fell back unconscious. When taken out he was insensible, and although two doctors worked hard over him for an hour or more, he could not be restored.—R."

MR. A. B. SEAL has been elected Treasurer and Secretary of the Milton (Pa.) Gas Company.

THE Messrs. G. and W. Walker, Limited, of the Midland Iron Works, Dounington Salops, England, have been awarded the contract for the construction of a storage holder on the plant of the Consumers Gas Company, of Toronto, Canada. It is to be of the 4-lift order, is to rest in a steel tank, and is rated to hold 3,000,000 cubic feet. Several American firms bid on this work.

THE officers named to manage the affairs of the Union Gas and Electric Company, of Bloomington, Ills., for the ensuing year, are: President, J. A. Wilson; Vice-President, J. T. Lillard; Treasurer, J. O. Wilson; Secretary, W. Parritt.

MR. F. R. PERSONS, writing from St. Louis, under date of the 16th inst., incloses the following: "Mr. T. W. Hynes, Chairman of the New York City Commission, who has recently returned from New York City, is confident that the celebration of New York City Day, October 3, and that of New York State, which will be on October 4, will bring great numbers of New York people to the Fair. The false reports of exorbitant hotel rates and incompleteness of the exhibit have kept many New Yorkers from visiting the Exposition, but now that the immensity and variety of the exhibits are beginning to be realized, and it is known that the stories of exorbitant rates are unfounded, they are making preparations to attend the Exposition. Elaborate preparations are being made for the two New York days. Mayor George B. McClellan, the Commissioners and other prominent New Yorkers have promised to be present, and no pains will be spared to render these 2 days memorable."

MANAGER BAEHR says that the plant of the Portage Lake (Mich.) Gas and Coke Company will be ready to furnish gas to the residents of Hancock by October 20th, and that Houghton will be hooked up for service by December 1st.

IT looks now that work on the proposed gas plant for Orange, Mass., will be commenced this fall. The estimated cost of the construction complete is put at $60,000.

Engineering News, in recent editorial comment, remarked: "One of the most notable gaps in American technical literature is in the field of gas engineering. There is practically no American book on the manufacture and distribution of gas for light and power or on any phase of either. So notable was this deficiency a few years ago, and more particularly the lack of technical instruction in gas engineering and gas works operation, that the American Gas Light Association established an educational fund and a correspondence school. The instruction papers for the pupils enrolled in the school come nearer, we believe, to an American treatise on gas works than anything else in existence, but those papers are available for enrolled students only. It hardly seems possible that so serious a deficiency as this could continue to exist much longer, particularly since a gas engineer of international reputation recently became the head of one of our leading technical schools.

THE new gas plant at Hamburg, Pa., is giving good satisfaction to its owners and operators, which statement is quite acceptable to Mr. A. M. Sutherland, who constructed it. The generating apparatus is of the Lowe-Sutherland type, with a daily capacity of 175,000 cubic feet. The ground plan of the works is of the roomy type. Supt. Miller is out to make a record at Hamburg.

[Report, as Furnished by the Secretary—Continued from Page 250.]

PROCEEDINGS OF THE CONGRESS OF GAS ASSOCIATIONS OF AMERICA.

HELD IN LIBRARY HALL, HALL OF CONGRESS, LOUISIANA PURCHASE EXHIBITION, ST. LOUIS, MO., WEDNESDAY AND THURSDAY, JUNE 15 AND 16.

THURSDAY'S SESSION, JUNE 16.

The President (Mr. Pratt)—The next business before the Association is the paper, by Mr. Donald McDonald, of Albany, N. Y., on

STATION METERS,

which was read by the author as follows:

The function of the station meter in a gas works is to measure the gas made as it passes from the works to the holders, and for this purpose the wet form of meter is employed almost exclusively.

As made and used in this country, the station meter may be described generally as cylindrical in form, with a cast iron case inclosing a revolving measuring drum made of sheet metal and divided by partitions into compartments; the case is filled with water to a line sufficiently high above the center to seal the partitions of the drum. At this determined water line the capacity of the drum for one complete revolution is ascertained by calculation and proved by experiment. This amount is transferred by gearing to the index, which is mounted in the center of the front head.

An attempt will be made in this paper to give some account of the invention and subsequent development of this indispensable part of the gas work's apparatus.

No account of the invention of the wet meter in any of its forms could be written without quoting from that standard text book of the gas industry, "King's Treatise on Coal Gas," and acknowledgment is hereby made, without further reference, of the use in this paper of such matter pertaining to the subject as is found in that work. So far as the historical part of the subject is concerned, the writer's only object is to place before you in a convenient form a summary of the history of the station meter with some mention of early forms, and to emphasize, if only in a modest tone, the debt that this generation owes to that small band of English gas engineers who founded this industry of making and selling illuminating gas.

Clegg's Meter.—Samuel Clegg may be called the inventor of the wet meter, evolving the device along two lines. One, an attempt to produce a revolving gasholder, and the other, an attempt to measure gas correctly to the consumer. His early attempts at measurement were made, first, with bladders, and afterward with holders rising and falling alternately. He was working at the same time on a plan for a rotative holder, which he believed advisable on account of the difficulties experienced in constructing gasholder tanks. The date of the invention of this machine is not known, but it was quite some time prior to 1817, at which time it was in operation at the Peter Street gas works, London. Fig. 1 shows a section of this holder which, in transverse section, was rectangular and closed at each end.

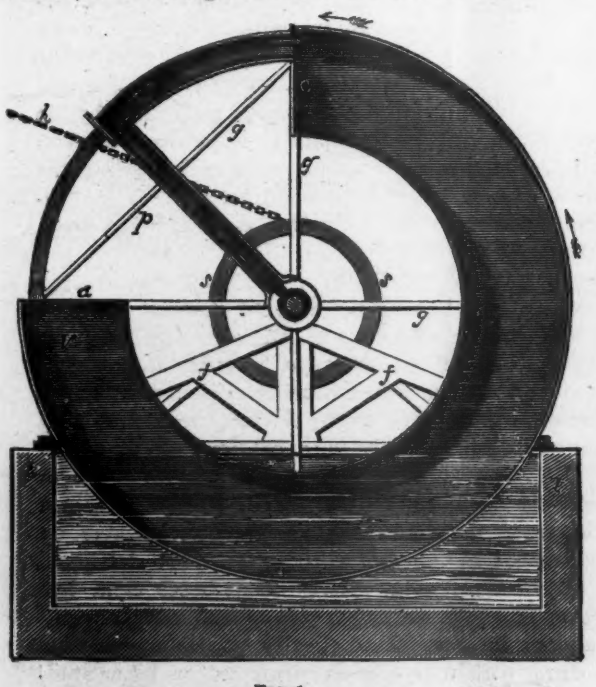


FIG. 1.
CLEGG'S ROTARY GAS HOLDER.
Reproduced from King's Treatise.

Note.—*t* is a tank filled with water provided with a wooden frame, *ff*, carrying the holder, consisting of a hollow shaft to which was fastened a framing, *gg*, carrying a winding drum, *ss*, and an annular vessel, *v*, which was open to the atmosphere at *a*, and closed at *c*; *p* is a pipe connecting the hollow shaft to the annular chamber; *h* is a chain passing around and attached to the drum, the other end passing over a pulley and carrying the counterbalance weight. The gas entered through the hollow shaft, was conveyed by the pipe, *p*, to the annular chamber, forcing the holder to revolve in the direction shown by the arrows. When the point, *a*, became immersed the gas was shut off by closing the inlet valve. The outlet valve was then opened and the holder would revolve by its own weight in the opposite direction and expel the gas.

The most casual study will show the relation of this machine to the finally evolved station meter for measuring the gas made at the works, and also to the consumers' wet meter for measuring gas sold to the consumer. Clegg undoubtedly had the principle of this machine in mind when he conceived his first gas meter, a patent for which he took out, December 9, 1815. King states that the patent covered two machines. He describes, however, only one, said to be the smaller and more feasible.

Clegg's First Meter.—This is shown in Fig. 2, and consists of an outer case with a revolving drum divided into two compartments, *a* and *b*, and closed on all sides. The axis, *c*, is hollow, rotating upon a pivot at one end, and within a stuffing box at the other, to which is connected the inlet pipe.

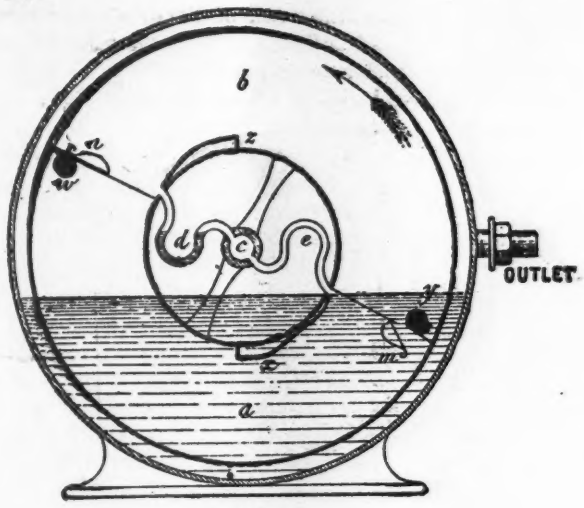


FIG. 2.
CLEGG'S FIRST METER.
Reproduced from King's Treatise.

Note.—The gas passing through the hollow shaft and scroll tube, *e*, entered the chamber, *a*, causing the drum to rotate in the directiod of the arrow. The valve, *m* (shown open), closed when the drum had rotated sufficiently to raise it above the water. When the rotation of the drum brought the partition carrying the valve, *n*, in contact with the water, the valve opened and allowed the water to pass into the chamber, *b*, expelling the gas by the hole, *y*; *z* and *x* are buckets carrying sufficient water to fill the scroll tubes once during each rotation, which, acting as valves, maintain the seal.

While this machine was far too delicate for practical use, yet it undoubtedly supplied a foundation for the wet meter perfected in all its various forms since. In it we have the circular form of wheel revolving in an outer case and divided into compartments which alternately receive and deliver gas and actuated by the pressure of the fluid it was designed to measure.

Malam's Meter.—In a paper read before the Society of Arts, dated

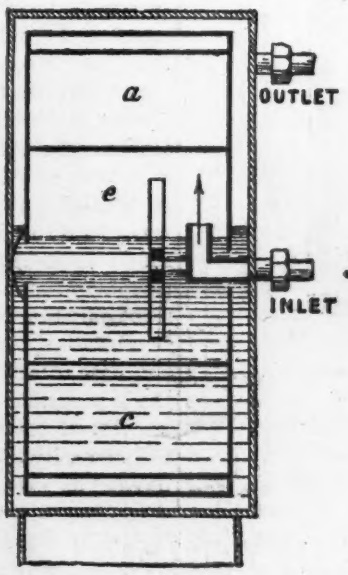


FIG. 3.
MALAM'S METER.
Reproduced from King's Treatise.

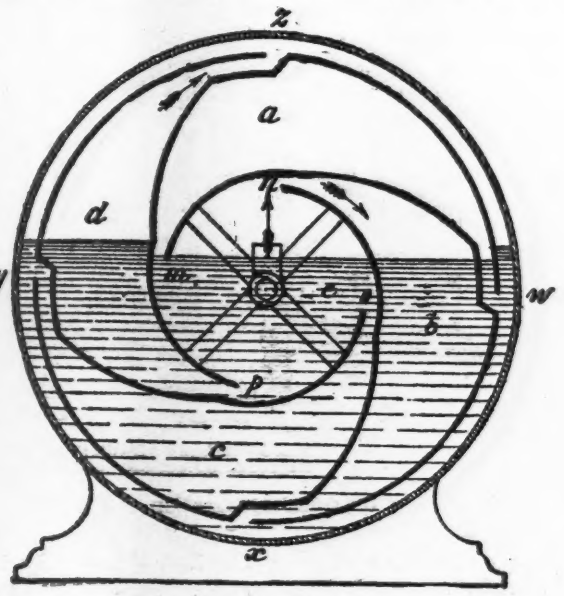


FIG. 4.
MALAM'S METER.
Reproduced from King's Treatise.

March 10, 1819, John Malam described a meter embodying additions and improvements to the Clegg meter, drawings of which he had subsequently submitted to the Directors of the Chartered Company, London, by whom he was employed as a draughtsman. Fig. 3 is a transverse section and Fig. 4 a sectional elevation of this meter, the drum being divided into five compartments, one in the center and four placed around it.

Note.—The gas entering at the inlet passed by means of a bent pipe into the central chamber, *e*, and, as will be seen, escaped only by the opening, *n*, to the chamber, *b*, where, by its expansive action on the water and the sides of the chamber, it caused the drum to rotate to the left until the opening *x* rises above the surface of the water. When one-quarter of a revolution has been effected the opening, *n*, is dipped into the water and the opening, *o*, has risen above it and the gas enters *c* by *o*, thus continuing the rotation.

The principal fault of this meter was the great amount of pressure absorbed by its operation, but it was a distinct advance over Clegg's meter, by reason of the introduction of the bent pipe or dry well which, rising above the level of the water in the central chamber, delivered gas continuously throughout the rotation of the drum.

Crosley's Meter.—Samuel Crosley became possessed of Clegg's patent right and made improvements on the meter of both Clegg and Malam by dividing the interior of the drum into compartments by partitions set at an angle favorable to their passage through the water, thus bringing the inlet and outlet openings at either end of the drum, and this practice, with Malam's dry well and hollow cover, which was also Malam's invention, gives us the wet meter as we know it to-day.

Figs. 5, 6 and 7 show three views of Crosley's drum, Fig. 5 showing

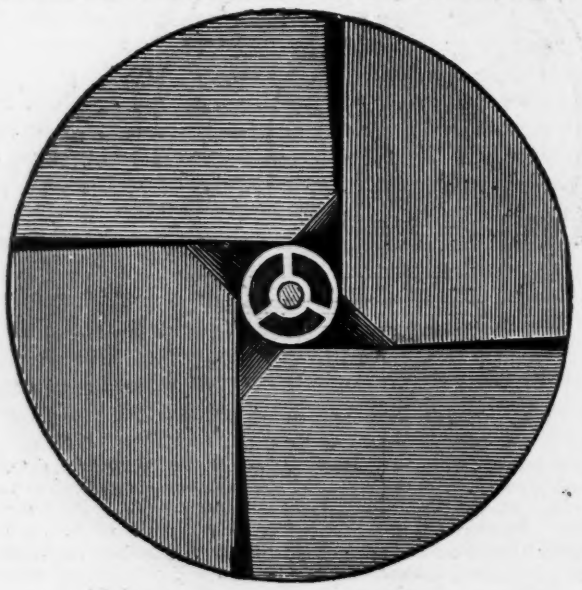


FIG. 5.
END VIEW OF CROSLEY'S DRUM.
Reproduced from King's Treatise.

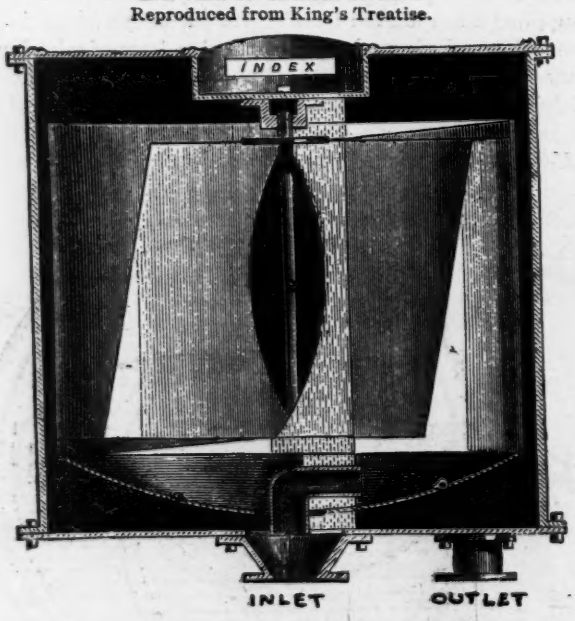


FIG. 6—CROSLEY'S DRUM IN CASE.
Reproduced from King's Treatise.

the outlet end, Fig. 6 a transverse section of the drum in its case, and Fig. 7 a cross section.

Crosley's drum, or wheel as it is often called, may be regarded as a 4-threaded screw, each thread or spiral being enlarged toward the middle and spreading over an arc of nearly half the circle. The Malam form of drum was also a 4-threaded screw, but of a different kind, the principal difference being that the spirals may be said to be cut on a cylinder of metal, while Crosley's are cut on a cylinder of water.

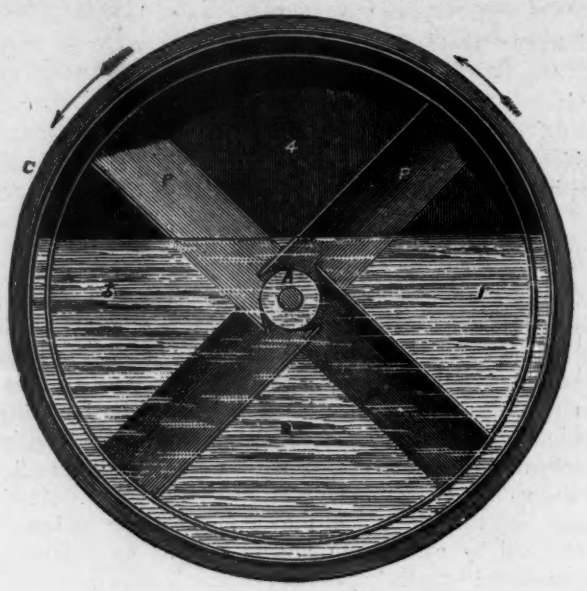


FIG. 7—CROSLEY'S DRUM IN CASE. Showing Slant Partitions.
Reproduced from King's Treatise.

Note.—The gas entering at the dry-well, *v*, passes through the drum and out at the front end, then over the drum between it and the case to the outlet, *s*, causing the drum to revolve to the left by the pressure on the surface of the water below and the slanted partition above, forming an ever-increasing pyramidal space between the surface of the water and the plane of the slanted partition.

That Crosley's drum continued to be the standard for so many years is a further evidence of his inventive genius. It may be said, however, that the demand for station meters was very limited and but few people were at all familiar with the subject. Besides this, the introduction of the dry meter and its general use as a consumer's meter in this country led to a comparative neglect of the subject of wet meters, and Crosley's drum being the generally accepted type for consumer's meters the station meter drum was made on about the same lines. With the constantly increasing use of gas, however, came a demand for larger station meters than heretofore made, bringing problems of construction for solution not met with in the smaller sizes. This was further brought about by the introduction of water gas, making it often necessary to measure the amount of daily production in a few hours. This was especially true in this country, and the meter makers were led to a more careful study of the subject, and Crosley's drum as adapted to station meters was greatly improved. These improvements were mainly in details of construction and modifications of form in an endeavor to secure a drum with a maximum capacity per turn and a minimum amount of friction occasioned by its action and having a greater durability than heretofore.

While Crosley's plan of having four compartments in the drum continued to be the practice, one improvement in particular was made by enlarging the center opening, or the distance from the inner edge of one slant partition to the other. This gave a freer passage for the water and increased the pitch of the slant partition, producing less friction by the rotation of the drum. It was found, however, that there was a limit in this direction on account of the loss of capacity caused by raising the waterline, offsetting the gain in loss of friction. Cast iron drum centers were also introduced and a system of bracing, constituting a drum frame and making the drum much stronger.

Parkinson's Drum.—In May, 1882, William C. Parkinson patented in England a wet meter drum having three partitions, and a patent was issued to him in this country, May, 1884. This drum proved to be much more sensitive than the 4-partition type, rotating at a higher periphery speed at a given loss of pressure, it being evident that, as the slant partitions in Crosley's drum give nearly the total resistance to its free rotation, the elimination of one of the four partitions gives a resultant ease of action. This would apparently give it an advantage over the 4-partition type of 25 per cent. in capacity, due to an increased number of revolutions at a given loss. This is reduced, however, by the necessity of a somewhat higher waterline, and by the drum not having as great a measuring length, giving about 5 per cent. less capacity per revolution and thus making a gain of about 20 per cent. in hourly capacity at constant loss. Theoretically, its action ought not to be as steady as a drum with four compartments, as the latter at all times presents an additional opening for receiving and discharging gas,

and practically this is a fact, but this unsteadiness is not so marked as to be harmful in a station meter, and on account of its greater ease of rotation it is preferable to Crosley's 4-partition drum.

Fig. 8 illustrates an end view of a modern, 3-partition drum which

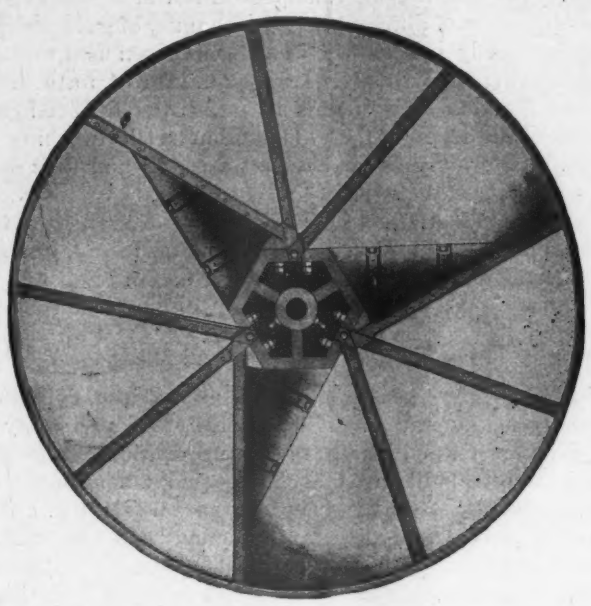


FIG. 8.—END VIEW OF THREE PARTITION OR PARKINSON DRUM.

shows its essential difference from the 4-partition, and shows the method of using cast iron centers fastened to the shaft with angle iron bracing.

The manufacture of this drum was begun in this country soon after the issue of the patent by a well-known house, who built station meter drums of this type exclusively until the expiration of the patents, when the other meter houses adopted it, and it still has a large sale, although some makers continue to build the older form with four partitions.

Hinman's Drum.—In December, 1896, patents were issued to Mr. Charles W. Hinman, of Boston, Mass., for a wet meter covering original ideas and improvements and constituting what has proved to be the greatest advance in the correct and economical measurement of gas by station meters since the introduction of the 3-partition drum.

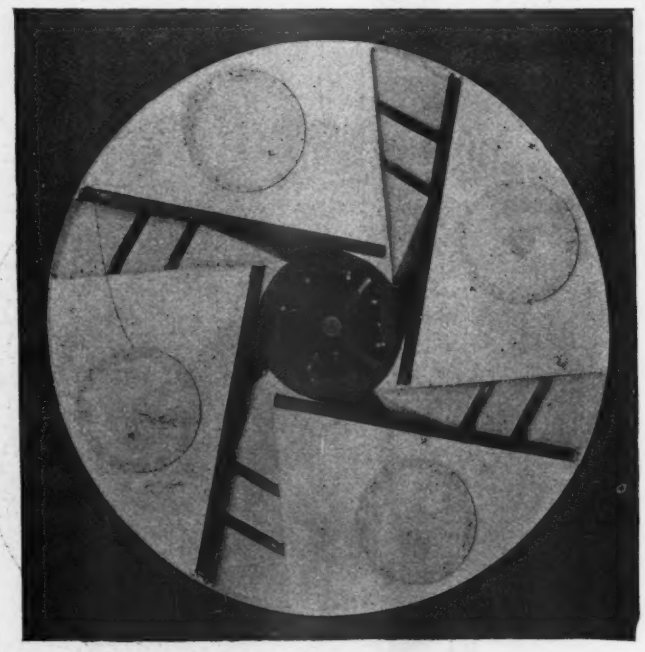


FIG. 9.—OUTLET VIEW OF HINMAN'S DRUM. From a photograph.

The case of the meter is of the usual form, but the effective length inside is increased by discarding the registry sinkage and shortening the dry well box. The drum is the same in principle as Crosley's and has 4 partitions, differing from it by more completely utilizing the space in the meter case, thus passing more gas per revolution, and in offering less resistance to the water when rotated, thus allowing a greater speed of rotation at constant loss of pressure.

The space in the case is more completely utilized by making the drum larger and placing 4 wings at each end in a plane perpendicular to the shaft, by using a comparatively flat hood or hollow cover, a flattened dry-well, and by forming pockets open to the interior of the drum in

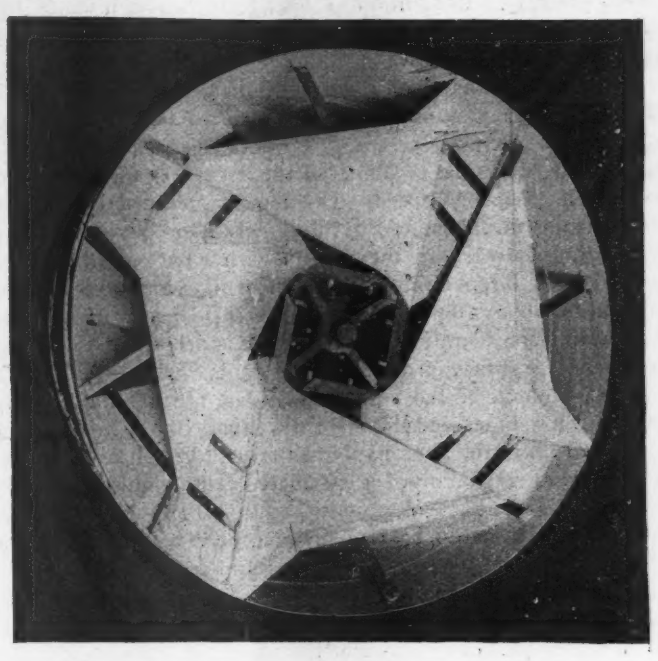


FIG. 10.—INLET (or Hood) END VIEW OF HINMANS' DRUM. Showing method of forming pockets. From a photograph.

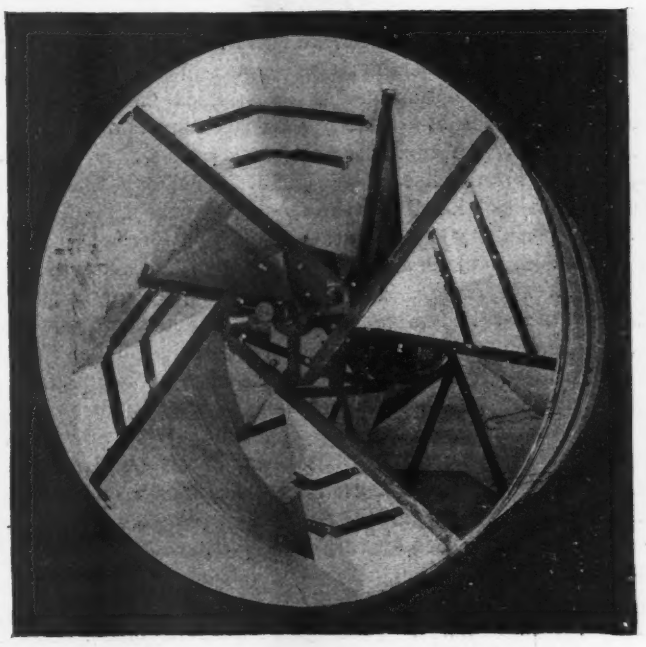


FIG. 11.—INTERIOR VIEW OF HINMAN'S DRUM. Showing method of forming partitions. From a photograph.

the space under the hood, by means of which the space formerly devoted to the hood, and which did not measure, is largely reduced and the space so gained is devoted to measuring purposes. Besides being lengthened at both ends, use is made in this drum of 8 triangular, pyramidal spaces, 4 at each end of any drum of Crosley's type, each space having for two of its sides the surface of the water, and for another side one of the divisions of the drum.

The less resistance of the Hinman drum to rotation in the water, so far as it is affected by its shape, is due to the fact that the average angle, which the divisions of any drum with a flat slant partition make with the water as the drum rotates, is much larger than the average angle made by the divisions of the Hinman drum. The peculiar shape of the drum, allowing also an increase in the size of the waterways without a consequent reduction in capacity, gives an added ease to rotation.

In any wet meter drum the force which makes it rotate is proportional: To the difference of the pressure of the gas on two sides of a division, to the projected area of that portion of the division above the water, and to the average distance of the surface on which the pressure is exerted from the axis of rotation. The Hinman drum as compared with other types has a larger projected area, and, what is of particular importance, this area is at a greater average distance from the axis. It is impossible to give the exact theoretic value of each of these changes, but the figures given further on in this paper will show the practical advantages gained by the use of this drum. In a general way it may be said that the Hinman drum as constructed to-day will run at about 50 per cent. greater periphery speed than the Parkinson type at a given

loss of pressure. In addition to this a gain has been made, as has been explained, in the capacity per revolution, this gain being proportionally greater in the larger sizes.

Another point that should be mentioned in passing is that by reason of the peculiar position of the partitions in this drum it lends itself readily to an extremely strong form of construction, so that it is possible to guard against the effect of the stresses resulting from rotating it at a high periphery speed. The results obtained by the use of this drum are so far ahead of anything heretofore obtained that it may be interesting to compare the results with what might be theoretically possible. A large Hinman drum recently constructed passed in one revolution about 70 per cent. of the total capacity of the case, which, taking into consideration the fact that it is necessary to have some space utilized as gas way, is within 10 per cent. of the theoretically possible cubical contents of the case that can be utilized for measuring purposes. This shows that there is little advance possible over the Hinman type of drum in the amount of gas that can be delivered per revolution. The speed of revolution of a wet meter drum would seem to be limited only by practical considerations and that there is no theoretical limit available. It should be remembered, however, in this consideration that the resistance to rotation increases at least as fast as the square of the increase in speed, and bearing this in mind, the very great increase of speed of rotation of this drum was very much more of an achievement on the part of its inventor than was the increase which he gained in capacity.

Millet's Drum.—On February 16, 1904, a patent was issued in this country to Laurent Millet, of Paris, France, for a gas meter. According to information furnished the writer, this meter was originally designed for use as a consumer's wet meter, but within the last year has been applied as a station meter. It is stated that at least two station meters of considerable capacity have been built on the Continent. It would appear from such information as the writer has been able to obtain to be somewhat of a departure from any form hitherto constructed. It is claimed that the measuring wheel or drum will rotate at a high periphery speed, but at this writing it is not possible to obtain sufficient data to make a fair comparison with other types.

Proportional Meters.—Something should be said in passing in regard to the so-called proportional station meter, and the writer trusts not to be misjudged in saying that, to the meter maker educated to believe in the correct measurement of gas, there is no such thing as a "proportional" meter. The law that the quantity of gas which passes through an orifice is in direct proportion to the area, providing the pressure is always the same, has always been an attractive theory to those interested in gas measurement, and it has been no less a pitfall to many inventors. Meters based on this principle have been devised in many forms and called by various names, such as inferential, equalizing, proportional, etc., in all of which the total quantity of gas is not actually measured, but subjected to various conditions during its transmission, from which the quantity passed is inferred. In 1820 Malam invented a machine having an arrangement made to secure a constant pressure upon the gas flowing through an aperture and connected to a clock movement so arranged that when the aperture was open the clock moved at such a rate as represented the area opened.

In 1824 an inferential arrangement was patented by Congreve, consisting of a cock and tube of given diameter with a clock attached to the tube, which was put in action by the opening of the cock, stopping when the cock was closed, thus registering the time the cock continued open. This affair depended entirely on a uniformity of pressure, and while it actually obtained a wide adoption in France at one time, it has been lost sight of except to occasional inventors who fail to make examination of the files in the Patent Office before spending much time on similar devices.

A curious inferential meter was patented by Clegg in 1830, and known as the pulse meter, depending for its action on the pulse glass, which was caused to oscillate by the heat resulting from the burning of a part of the gas passing. It is said that this instrument was brought to such perfection that it would not vary more than 5 per cent., and the astonishing part of it is that it was largely adopted in some Continental works as a consumers' meter. In 1842 an inferential station meter was patented by Mr. Edge, by which the quantity of gas passing was ascertained approximately by the measurement of a fractional part of the full volume, this machine consisting of a cylindrical tank inclosing a holder sealed with water and with two outlets controlled by cone valves of varying sizes and of a given proportion to each other. The gas being admitted beneath the holder caused it to rise, and the amount passing the orifice controlling the smaller valve was measured by a small wet meter and the whole quantity ascertained by inference. Clegg used this same principle in a consumers' meter, which he called an equalizing meter, as it was intended also to act as a governor. In recent years various devices have been placed on the market for measuring gas by inferring from the measurement of a small quantity the total amount passed. The most notable example consists of a machine having two balanced valves of different size, the quantity of gas passing the smaller being accurately measured. This meter has been used to quite an extent for measuring approximately large quantities of natural gas, but has not been found to be a success in measuring artificial gas, chiefly on account of the action of the condensation on the working parts of the valves, interfering with their perfect working and thus destroying the due proportion of the areas of their openings.

The Station Meter in the United States.—Returning to the subject of the station meter as it is made in this country to-day, it may be divided for convenience of description into three heads:

The outer case.
The measuring drum.
Various appliances and fittings.

The Case.—The case is usually built of cast iron, cylindrical in form and supported by cradles. It is generally and preferably of the same internal diameter and length, this being considered the best practice. Cases have been built with other than equal dimensions, but no advantage is gained by any radical departure from this rule. The inlet gasway is in the center of the rear head and with two outlet gas ways above it and on either side of the center line, the unused outlet being covered by a plate. In the newer styles of cases the outlet is directly above the inlet, and in the larger sizes often on the front head in the same relative position. Projecting into the case through the inlet gas way is the inlet or dry-well box, having at its inner end a shaft bearing. This box is held in place by a flange which is bolted to the outside of the head by flat-head screws and against the outer face of which the inlet connecting elbow is bolted. On the inside of the front head is bolted a registry box or sinkage which carries the front end of the shaft. In the newer styles of case this box is dispensed with and the shaft bearing is cast on the head.

The construction of the case varies in the different sizes of meters. The smaller cases, from 4 feet to 8 feet, are usually made with the body or shell cast in one piece and the heads each in one piece. This practice is also followed in 9-foot meters by some makers, and 10-foot and even larger sizes have been made in this way. These large castings are very unwieldy, however, and inconvenient to handle. Meters of these sizes are shipped by the makers complete, ready to set up and run, and the gas company has only to set the meter on the stand and make the proper connections.

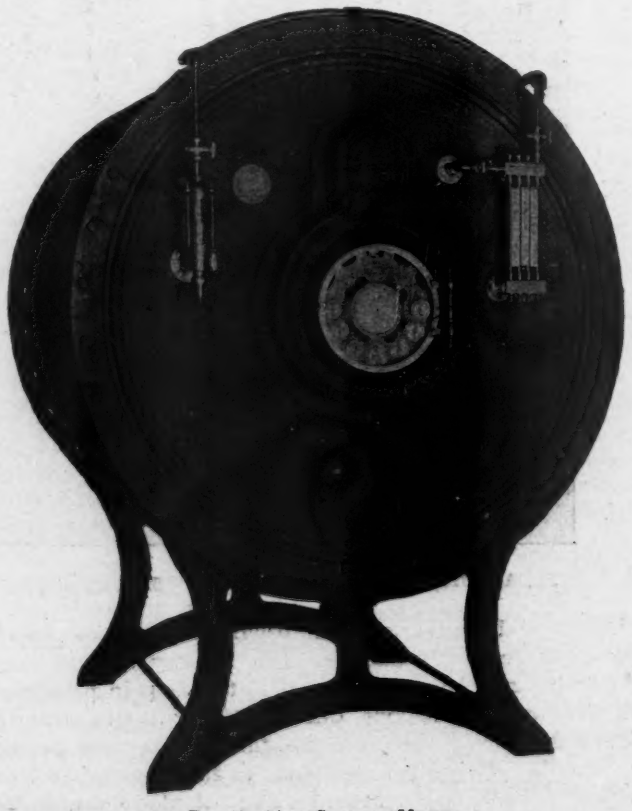


FIG. 12.—54 IN. STATION METER.

Meters above 8 feet, with the exception of the 9 feet as noted, are built *in situ* and the case is built in sections. The body is built in staves, one or two pieces in length and six or eight pieces around. The

heads are usually built with a center circular piece and three or more sector pieces. The joints are machined and made up in red lead putty and substantially bolted together with machine bolts and nuts. Some large cases have been made of wrought iron, which construction gives a handsome appearance, but the cost is largely in excess of the cast iron case; a notable instance of this construction being two of the three 18-foot 6-inch meters at the Twenty-first Street Station of the Consolidated Gas Company, New York, these meters, by the way, being the largest ever built in this country, although not of the greatest capacity, having been built before the advent of the Hinman drum.

(To be Continued.)

TWELFTH ANNUAL MEETING, PACIFIC COAST GAS ASSOCIATION.

HELD IN MECHANICS' INSTITUTE, SAN FRANCISCO, CAL., JULY 19 AND 20, 1904.

FIRST DAY—JULY 19—MORNING SESSION.

The 12th annual session of the Pacific Coast Gas Association was called to order by the President, Mr. W. A. Aldrich, at 10.20 A.M., of July 19th. The President welcomed the delegates and visitors and congratulated the Association on the large attendance.

The formal

ROLL CALL

was omitted, but the following members were in attendance:

Honorary.

Eichbaum, F. H. Barrett, W. T.

Active.

Adams, H. E.	Fitzpatrick, F. E.	Matthiesen, A. J. P.
Alden, S. F.	Froelich, Christian.	Miller, C. O. G.
Aldrich, W. A.	Foveaux, Frank.	Malloch, Henry.
Alstron, W. F.	Gillespie, W. W.	Newbert, L. H.
Arques, C. L.	Godon, Geo. E.	Parker, T. R.
Beck, A. C.	Grimwood, Chas. P.	Pedersen, B. S.
Biggerstaff, E. K.	Grover, Sherwood.	Pennoyer, C. H.
Britton, John A.	Gunder, W. T.	Poingdestre, J. E.
Boardman, W. F.	Guthrie, Samuel.	Quilty, C. W.
Brouse, E. H.	Gutsch, A.	Randall, E. C.
Burkhardt, H. W.	Hargreaves, Robt. H.	Rice, A L.
Byerly, H. O.	Hill, Wm. H. P.	Riffle, Franklin.
Carrigan, A.	Holberton, Geo. C.	Roper, Geo. D.
Casey, Wm. J.	Hollidge, Geo. H.	Ross, F. A.
Chapin, W. W.	Hughes, Charles.	Sterling, R. H.
Cheffins, E. F.	Jones, E. C.	Symmes, F. J.
Clark, O. E.	Jones, F. C.	Thomas, John W.
Clements, John.	Kaneen, John S.	Thompson, Geo.
Colquhoun, Geo. S.	Kahn, Lazard.	Thompson, Robert J.
Conlisk, C. W.	Keyes, H. F.	Vanderwhite, A. J.
Cressey, F. A., Jr.	Kirk, George.	Valentine, R. P.
Cushing, S. B.	Keyes, Henry C.	Wilson, G. W.
De Salba, E. J.	Leach, F. A., Jr.	Wiester, W. H.
Dill, W. N.	Low, George P.	Weber, Harmann
Doherty, H. L.	Lowe, L. P.	White, W. A.
Du Val, Wm.	Lowe, S. C.	Worry, John
Druffel, D. O.	Lloyd, A. J.	Wanser, H. S.
Feist, Adolph.	Martin, John.	

Associate.

Chico (Cal.) Gas and Electric Company, A. J. Stephens.
Colusa (Cal.) Gas and Electric Company, J. D. Kuster.
Nevada County Gas and Electric Company, John Werry, Nevada City, Cal.
Nevada County Gas and Electric Company, J. E. Poingdestre, Grass Valley, Cal.
Petaluma (Cal.) Gas and Electric Company, H. Weber.
San Francisco Gas and Electric Company, W. J. Wrenn.
San Louis (Cal.) Gas Company, R. N. Frick and B. F. Thomas, San Louis Obispo.
San Rafael (Cal.) Gas and Electric Light Company, F. E. Fitzpatrick.
Spokane (Wash.) Gas Company, W. A. Aldrich.
Stockton (Cal.) Gas and Electric Company, H. E. Adams.
Suburban Electric Light Company, Wm. Angus, San Leandro, Cal.
United Gas and Electric Company, C. H. Pennoyer, San Jose, Cal.
Woodland (Cal.) Gas and Electric Company, W. E. Osborn.
Sacramento (Cal.) Electric, Gas and Railway Company.

On motion of Secretary Britton the reading of the minutes of the last session was omitted, and submitted to the Association the minutes of the two meetings of the Board of Directors, as dealing with matters pertinent to the meeting.

The Secretary then read the report of the Board of Directors, which, on motion of Mr. Martin, was adopted, as were the reports of the Secretary and Treasurer, the report of the Library Committee, and that of the Committee on Permanent Headquarters.

The report of the Advisory Board was next read by the Secretary, which, on motion of Mr. Martin, was accepted and its recommendations adopted.

A fraternal letter from Mr. J. B. Grimwood was read by the Secretary, who also announced that, owing to the serious ilness of Prof. Booth, he would be unable to deliver his promised lecture on Radium.

Mr. Lowe, having said they were all very sorrow to hear of the illness of Prof. Booth, moved a sincere vote of thanks for his good intentions. Adopted.

The Secretary then read the names of those recommended by the Board of Directors for election as members of the Association, and on motion the recommendations were approved and the gentlemen named were declared duly elected.

President Aldrich then read the following

INAUGURAL MESSAGE.

It is with very great pleasure that I welcome the members of our Association to this twelfth annual meeting. I am aware that I come among a body of gentlemen not particularly interested in inclined or vertical retorts or charging machinery—owing o the fact that your wonderful State, so prolific in mineral and agricultural resources, now seems to have filled the cup of productiveness to the brim with an almost inexhaustible oil supply—and which to-day is the fuel used generally throughout California for gas making—that I propose rather to address you briefly on the great strides made in the gas industry during the last 50 years, and to give expression to a few thoughts on matters of general interest.

Let us pause, however, to first pay a tribute to the memory of one who has passed away from this world of strife and contention; by the death of Joseph Bryant Crockett, the first and twice President of this Association, we have lost one of the most loyal and devoted of our members. While I do not agree that a gas convention should be turned into a memorial service for the departed—rather let us be encouraged and strengthened in our efforts during life. Considering the great service rendered this Association by our last past-President, it is meet that suitable resolutions should be passed and entered on the permanent records of the Association.

I have also received with very great regret the resignation of our former Secretary, Mr. J. B. Grimwood, who has faithfully and conscientiously fulfilled the duties of his office since his election, July, 1899. Failing health has necessitated him taking a complete rest from business cares. I know I have interpreted your desire in wishing him a speedy return to health and strength. Fortunately for the speaker and this Association, there was a man among us who, notwithstanding the great responsibilities of his official position, was ready, as he ever has been, to step into the breach, and now Mr. John A. Britton occupies his old stand as Secretary and Treasurer, and I congratulate the Association and personally thank him for the sacrifice he has made.

When we consider the fact that 50 years ago there were but 30 gas companies in the United States, the progress made in the gas industry is most extraordinary and only exceeded by the improved methods of manufacture and distribution. The total capitalization of all gas companies in 1850 was $6,774,000. At the end of the year 1903 there were 950 gas companies with an issued capital stock of $408,194,753.

Mr. S. N. D. North, chief statistician for manufactures, states that this striking increase in capital is found chiefly in items of machinery, tools, implements and equipments, the number of wage earners having increased from 952 in 1850 to 34,792 at the end of the year 1903. The cost of material increased from $503,074 to $21,605,356, and the by-products from $1,921,746 to $76,516,693.

Still more remarkable is the progress made in heating appliances. I have communicated with 19 gas stove manufacturers in the United States, requesting statistics on the output of gas ranges, hot plates, heaters and water heaters, with the result that I am able to place before you authoritatively figures which are as extraordinary as they are gratifying. Up to and including the year 1896 there were approximately 335,000 gas ranges in use. I am unable to give the number sold each year, as I was requested to deal with the statistics as a whole—the information being given confidentially—for the information of this Association. From 1899 to 1903, inclusive, the numbers of gas ranges and other heating appliances sold by 19 gas range manufacturers were as follows: Gas ranges, 765,909; hot plates, 136,032; heaters, 162,918; water heaters, 38,864.

It has been stated by some of the electrical journals that the march onward of electricity has been so rapid that gas has been relegated to second place and that there are more wage earners in the electric than in the gas industry. By what extraordinary method of reasoning they have arrived at such an erroneous conclusion I am at a loss to understand. The following statistics I obtained from official sources for the year ending 1902. At the time stated there were about 950 gas com-

panies and 3,620 electric stations, so that from 2,670 towns in the United States we can almost hear the sigh of satisfaction and thankfulness that there are no gas companies in their midst. The 950 gas companies gave employment to 34,792 people, or an average of 36½ per company, and paid in wages $18,752,501, as against 30,226, or an average of 8½ employees per station of our electric friends, or for every employee of an electric plant there are 4¼ employees in a gas company.

The issued capital stock of the 950 gas companies amounts to $408,194,753, and which paid in dividends $16,801,351 during the year 1902, as against an issued capital stock of 3,620 electric light companies of $372,951,942, on which was paid in dividends $6,187,837 in 1902. In other words, while it is difficult to find a gas company with modern methods not paying fair dividends to investors, out of 3,620 electric light companies there were but 589 that paid dividends on either common or preferred stock. If these facts are not sufficient to show the hallucinations our competitors are under, I will give them further food for reflection and call their attention to the advent of the gas arc, of which it may be said that it has completely revolutionized store lighting. The speaker has communicated with every gas arc manufacturer of repute in the United States, to whom inquiries were sent for information. In the three years that gas arcs have been before the commercial world there are no less than 226,000 in use in the United States to-day. The number of gas arcs with an estimated consumption of 16 cubic feet per hour, burning 4 hours per day, amounts to 5,278,360,000 feet per annum, or more gas than the combined States of Ohio and California used during the year 1902. In this connection I would suggest that, with the exception of the inventor of the Welsbach mantle, no other man has done so much to stimulate the use of gas for store lighting as has Mr. A. H. Humphrey, the original inventor, whose fame has crossed the seas, for gas arcs are now being used in large quantities in England and Germany, Australia, Mexico and South America. It is safe to assume that of the large number of gas arcs in use at least 60 per cent., or 135,603, have displaced electric arc lights.

With all the progress that has been made in gas lighting and heating, it is to be regretted that gas for power has not kept apace. As a matter of fact this important subject has been too long neglected by gas men. There is no doubt whatever that the steam engine has reached its practical limit in the matter of economy and that some other and more economical prime mover will take its place. The gas engine is destined to fill that place. American gas engine manufacturers have awakened to the fact that European manufacturers were making gas engines in large units and shipping them to the United States for use in large manufacturing establishments and for central station use. There is no longer any necessity to send abroad for gas engines in large units. One firm with whom I have been in correspondence informs me that it is prepared to manufacture gas engines for power, or any other purpose, in units as large as 8,000-horse power in 2-crank engines, or up to 12,000-horse power in 3-crank engines, guaranteeing any of these engines to drive satisfactorily alternators in multiple. These engines may be built to operate with either natural, producer, coke oven or blast furnace gas, and the manufacturers are prepared to make very strong guarantees covering their satisfactory operation.

There certainly is a great future for the application of the combustion engine, for lighting and power work. It may be said that we are now stepping from the reciprocating type of steam engine to the steam turbine. It may, perhaps, with equal truth be said that we shall ultimately find the steam turbine generally supplemented by the gas engine, and there seems to be no limit to the extent of its application and the development of gas making processes in connection with it.

Undoubtedly Europe at present is ahead of us, as with a small profit they are required to take prompt advantage of every possible economy. Gas engines are now used very extensively abroad, but America seems to be commencing to take some active interest in the question. The development of processes for making cheap fuel gas has probably been arrested by the rather slow development of the gas engine. Until a few years ago the gas engine was not extensively used except in small sizes, yet to-day it may be said to have fairly reached a point of mechanical excellence which exceeds the best steam engine practice, and applicable to any class of service and in unlimited sizes. The engine is, therefore, perhaps now ahead of the gas making apparatus development, and it remains for engineers to become better posted on the gas question aud the designing of manufacturing apparatus. Then for extended use to introduce the necessary refinements and standards to insure certain results at minimum cost.

The economical use of gas engines as applied to high pressure fire service has been demonstrated at Philadelphia, where seven 280-horse power and two 125-horse power engines, all directly connected to triplex pumps, are now in service for the purpose of furnishing high pressure fire service to the business district of Philadelphia. The engines are capable of starting from standstill to full speed and load in something like 30 seconds. Of course, in comparison with a steam plant which necessitates steam to be kept up at all times for emergency service, the gas engine has no such standby loss, using no gas except when operated. I suggest it is the duty of all gas managers to familiarize themselves on this most important feature of our profession, as the demand for power is ever increasing.

One of the most important questions that gas companies will be called upon to consider within the near future is the relationship between employer and employee. The speaker fully realizes that labor has its rights equally with capital. What we do contend for is the inalienable right of a free-born American citizen to sell his labor to whom he pleases and for what remuneration he is willing to accept, with or without the consent of any irresponsible union, trades council or walking delegate. We do not deny the right of any man or organization to cease work whenever he or they so desire, but we do deny his right to prevent another, willing to accept the same conditions, from so doing. It is claimed by so-called labor leaders that the great aim and object of the union is for the betterment of the condition of the workingman, morally, physically and intellectually, and to that end shall receive adequate remuneration in exchange for the fruits of his labor. What are the facts? Take the plumbing business for example, which is more closely identified with the gas industry; experience has proved beyond the shadow of a doubt that the alpha and omega of its doctrine is to perform a minimum of labor for a maximum of wages and then proceed to enforce the doctrine by strikes and boycotts. As an illustration of how far the unions will go, let me take your memories back to that terrible catastrophe in Chicago a few months ago, when the Iroquois Theater was destroyed by fire, resulting in the death of nearly 600 persons. When the call came for carriages and drivers in order that the bodies might be buried, the order went forth from the unions that the union drivers—who were then on a strike—must not respond to the pleadings of the bereaved to be allowed to bury their dead. It is a fact that they afterward rescinded this order, but only in fear of the Nation's wrath. Later, in Colorado, within the last 2 months, a body of non-union men were waiting on the railroad platform in order to take the train to their homes after the day's toil, when an explosion of dynamite occurred directly beneath them, killing 14 and maiming several others, and this in the name of organized labor. What are you going to do about it? Why cannot capital and labor recognize their responsibilities one to the other? I have been in communication with Sir George Livesey, the distinguished Engineer and Chairman of the South Metropolitan Gas Company, of London, Eng., who writes me that with the adoption of the copartnership system labor and capital will go hand in hand, each fulfilling its respective part in our modern civilization. Sir George has been identified with the gas profession for more than 50 years. The area supplied by the South Metropolitan Com pany is 51 square miles and the total number of consumers is 250,677. He has made such a study of the labor question, says Mr. Carroll D. Wright, the United States Commissioner of Labor, that he may be regarded one of the greatest authorities in his line in the world, and his intimate knowledge of the working man and his character and peculiarities is exceeded by no other employer of labor. At the present time 4,000 men are on the payroll of the Company. Briefly, Sir George Livesey's plan is to give the men a direct interest in efficient and economical production by paying them a bonus on their wages, based on the price of gas. One-half of the bonus is required to be invested in the name of three trustees in the Company's ordinary stock, until the amount credited to any copartner is sufficient to give him a stock certificate in his own name; the remaining one-half is withdrawable at a week's notice, but may be left in the Company's hands to accumulate interest, or it may be invested in stock by the trustees.

The last semi-annual reports, for June, 1903, show that the employees had over a million dollars in stock on deposit and at interest with the company, an average of $250 a man. Summing up, Sir George says: "Employers must work in the direction of partnership with the men; in other words, they must make them partners in their business so as to make them take an interest in their work and achieve the best results for both. The interests of both are identical and not antagonistic; and that both sides ought to recognize."

What copartnership has done for the South Metropolitan Company it can do for any gas company, and I recommend the project to all gas companies throughout the land for their earnest consideration, as a panacea for the evils attending strikes, boycotts and the lawlessness

that necessarily follows, and we trust that Sir George will live to see the day that his plan is adopted generally.

Our Association is rapidly accumulating a valuable gas library which, unlike most libraries of technical associations, is coming into popular use. I notice among the books some of the rarest and most valuable works dealing with our business and its history, and the collection of books as a whole is well equipped with working tools of our craft. The advantages of the free use of this library should not be lost sight of by the members.

The list of papers to be read during this convention is before each member, and reference to them is unnecessary; you will undoubtedly conclude that a veritable feast has been provided which should command and will undoubtedly compel your close attention during the hours provided for the reading and subsequent discussions of same.

I would be lacking in appreciation if I did not at this time tender an expression of my sincere thanks for the great assistance I have received from the officers and editors of the different departments, and the authors of the various papers, and still again for the great honor conferred upon me as President.

Discussion.

Acting-President Lowe—Gentlemen, you have listened to an interesting address certainly characteristic of our beloved President. As a committee on the President's Address I will appoint: Messrs. Pennoyer, Boardman and Keyes.

The President then presented a report respecting his attendance at the Gas Congress in St. Louis.

Acting-President Lowe—As a committee who will report on this subject during the session, I will appoint Messrs. Martin, Jones and Britton as representatives of the Association and of the gas interests at large. I am very glad to see that we have Mr. H. L. Doherty with us. The subject is one that is close to his heart. In his recommendations on the matter of Gas Association Work he has given us what he believes to be for the best interests of the fraternity. After we have received the report the question should be given full discussion, and I am sure Mr. Doherty will have something to tell us.

Mr. John Martin, of California, then read his paper entitled

BENEFITS OF CONSOLIDATION AS APPLIED TO SMALL GAS COMPANIES.

At the first meeting of the Pacific Coast Gas Association the membership was largely composed of the owners and managers of the smaller gas plants throughout the Coast, each vieing with the other in exchanging experiences then and theretofore encountered in the previous 40 years' operation of these plants. The large majority were then selling gas at from $3.50 to $5 per 1,000 cubic feet.

I believe that it was at this meeting that a representative of the Welsbach lamp made a display and argued its advantage for use by gas companies as an antidote for incandescent electric lighting, but it was looked upon with marked disfavor. Any device that would give 8 times as much light with the same quantity of gas was thought to be undesirable. The members calculated the terrible loss in sales if every consumer would use Welsbachs, and they could see nothing but financial gloom ahead if this monster (?) were encouraged. In consequence the Welsbach lamp was mentally voted a thing unfit for human gas hands to touch, and thus its general utilization suffered, until finally it became absolutely necessary to use it as a measure of self-protection to partially limit the rapid strides of the then despised electric plant and electric lighting.

With this experience in mind, it was almost comical to hear them all testify, at a subsequent meeting a few years later, to the many advantages of this wonderful invention. In fact, when the inventor was a subject of discussion they did practically "Rise and call him blessed."

To the commercially analytical mind, the matters under general discussion at the earlier meetings carried the conviction that practically all managers of the smaller companies were devoting their time to the careful analysis and understanding of the wrong end of the business, their chief aim being to try to reduce "the cost in the holder," while little or no consideration was given to matters of distribution, contact with consumers, or aiding or abetting increased consumption in any way, by seeking avenues by which increased consumption might be promoted. It was in nearly every case a condition where the consumer was forced to seek the producer and where the producer deemed it a lowering of his dignity to meet with the consumer and point out to him ways and means by which he might become a larger contributor; extensions of mains were frowned down, and every obstacle put in the way of the purchaser by high prices, charges for meter sets, changes and removals, and the innumerable petty charges that made the old-time gas companies a household curse, and hardly a moment's time was given to the consideration of the advantages of reducing the price of gas one-half, and thereby increase the consumption five or tenfold.

It was this prevailing condition which prompted the writer and his associates to enter the gas field with the belief that aggressive, progressive and sound methods applied to the gas business should produce equally profitable results obtainable in the pursuit of other lines of business.

To have advocated methods and selling prices now prevailing would have been considered absolute heresy at that time, and the word "fool," with a few strong adjectives that would have been more expressive than elegant would have been the unanimous expression of the members with reference to anyone who could have had the temerity to give utterance to such thoughts. The greatest curse under which the gas men were then laboring could properly be termed narrow prejudice.

The adoption of modern, progressive methods, with broad and liberal treatment of patrons and competitors by those now directing the destiny of these companies, has done much to eradicate this curse, and there is hope that there will not be a trace of it left within the next 50 years.

Shortly after entering the gas field it became apparent that the very brightest minds should be employed to accomplish this commercial revolution. It was, therefore, necessary to acquire a number of these small plants, so that each could have the full measure of the benefits accruing from such an organization at a minimum monthly cost, and capital was freely invested with the full knowledge bought of results in other lines, that good interest would be made on the investment. Old time prejudice had of necessity to be eradicated in order that the man who held the purse would unloose the strings, and the past has proved the judgment of invested capital in promoting gas sales, noticeable in additional revenues, the profits on which have been sufficient to warrant continued investments to produce larger sales; to reduce the price to consumers is to create a demand from the public for our goods.

After the acquisition of a property, the first plan adopted was to lay mains practically everywhere in that town so that the manager was never at a loss for new material to work upon for trade. The generating plants were placed in first-class operative condition, with the best and cheapest method of manufacture. The public were given many inducements to use gas for fuel, both as to low cost of appliances installed and the price of fuel gas. The patrons were taught how to get the *best results with the least consumption*. This was so different in the old days!

The manager and his men were taught to be civil and polite to consumers—to attend to the troubles first, new business afterward. They were educated to understand that profit comes primarily from large production, thereby insuring larger financial income, and from economies only obtainable as a result of a large output. The office was removed from the dirty, dingy, foul-smelling gas works, to a nice, neatly furnished plate glass front store in the center of the town, so that it would be and is a pleasure for the most fastidious patrons to visit the company's office. In the event of any manufacturing, distributing or commercial problem presenting itself, the manager or employee can obtain satisfactory advice and counsel at once by consulting with those in authority in the respective departments.

The results obtained in each town are comparatively analyzed, and the superior results obtained in any one plant are immediately made operative (conditions permitting) at all the other plants. Small plants whose revenue or profits would prohibit the employment of engineering talent that would correct faults and errors in manufacture and distribution, have, by consolidation, command not only of the engineering skill but of the managerial, the commercial, the financial and also the accounting end, which by due systematizing, helps all other branches to a complete working out in harmony of plans for the general betterment of all departments. The local manager is of necessity broadened by contact with all of the departments, and so a system of general education is produced which widens the horizon of his knowledge and separates him from the narrow environment that follows where he has neither advice to give nor to get.

Thus it will be seen that the greatest advantage of consolidation of small gas companies lies in the fact that the owners are in a position to employ the brightest intellects and apply their efforts to a careful study of the maximum *true* economy permissible with the existing output and what measures to adopt to profitably increase consumption.

By "*true* economy," I wish to use the term as differing vitally from the term "economy," which was frequently used to convey the ideas of owners a decade ago, when the local manager was considered economical because he did all the work, gas making, gasfitting, running ser-

vices, trouble man, collector and bookkeeper (such as he was), and merely called economical because he did not call on the stockholders to put up a few dollars to increase the business. I have in mind such a man, who bought two gas stoves out of his private funds to demonstrate to his doubting stockholders of what advantage they were. It might be interesting to note that at this time in that town (population 4,000) over 500 fuel burners are in use.

The type of men who were owners or stockholders in gas companies organized for revenue only is happily passing away, and the successors of them are being educated along the line of greater liberality to themselves and to their patrons, and the efforts of the manager to build up the sales are applauded and awarded, the dispensers of the coin of the realm for betterments, needing only, like the Missourians, "to be shown." Systematic records of accounts, stock on hand, plant operation, maintenance, distribution, construction, installation, mains, services, meters, etc., are absolutely necessary for the proper conduct of such a consolidation. In consequence the managers are taught to be systematic and careful.

I attach herewith a few suggested forms of reports, as an index of how even a small business woven into the warp and woof of a consolidation must and does stand upon the same footing as his larger brothers. The system adopted is extremely simple, and while very complete as to detail, yet it entails no great amount of labor after it is put in operation.

It is good policy to make advancement from the ranks whenever possible, and if some of the employees have not been advanced as rapidly as they might think they deserved, it is only because the opportunity has not presented itself or that he is less proficient in some particular than he knows of. If it is the latter, it might be well for such a manager to carefully analyze his work and dispassionately analyze himself with a view of trying to discover and correct such shortcomings. It is absolutely necessary to avoid "playing favorites" except where such favoritism is based solely on meritorious service.

Another advantage of consolidation is the matter of purchases. This advantage is mainly valuable in reducing the investment cost of betterments and extensions and in the saving to your patrons in the cost of gas appliances, which are usually sold at cost. This latter advantage inures to the company's benefit chiefly through greater sales, resulting in larger consumption of gas, *the commodity* upon which you hope to make your profit.

Aside from the benefits heretofore recited of the advantages of consolidation, the large factors are those of concentration of effort centralized in one place, of protection to every company however small, in legal matters, legislation, taxation, insurance reduced to a minimum, based on equitable pro rata basis of administration, elimination of excess of officials, utilization of waste materials in one place from another, all the while retaining in the fullest degree the local coloring in each town, so essential to its proper growth and development.

It is well to remember that increased consumption means reduced cost per 1,000 cubic feet to the company, and while you may lose money at first by selling gas at $1.50 to $2 per 1,000, it is only a question of how fast you can increase consumption as to when you can earn a safe 6 per cent. on your investment. By selling gas at a low price, you are also protecting your investment against competition, which is usually fostered and encouraged when high prices prevail.

By consolidation, each plant is relieved from the necessity of earning any stipulated amount on capitalization, for each of the companies has nothing to do with capital; it is simply required to make a showing upon its gross business and is praised or blamed for the economies or waste it practices and the increase or decrease of its business, the fountain head taking care of the financial end, which, being eliminated from the care of the manager, renders him better fitted to look out for the interests committed to his care, he knowing full well that when he can prove the advisability of economical investment it will be made and *well made* for him, so that his burden only is in finding and holding the business that will be profitable.

It should be the aim of every manager to sell gas to every building and to every family in his town, and until then his labors should be unceasing.

Discussion.

The President—Gentlemen, this paper is a paper such as we might expect from such a broad-minded man as Mr. Martin is. He clearly shows how every interest is protected rnd how easy it is for many companies to be under one great head. The paper is before you for discussion, and I hope to have a very free expression of opinion.

Mr. C. O. G. Miller—I listened to the paper with a great deal of pleasure, for it gives a very good account of the benefits of consolidation. As an old gas man, however, I want to protest a little against Mr. Martin's description of what took place at the first convention. I do not think that the gas people there spoke of the Welsbach light as slightingly as Mr. Martin states. I think they realized the value of the burner. The company I was connected with did a great deal to introduce it, and the companies in San Francisco never lost sight of the fact that business and profits were increased by seeking consumers. Mr. Martin's remarks about reduction in price are splendid. I agree with him that a reduction in price does increase business and profits; but the gas companies in this State have gone through a period of change in the last few years which has not come entirely by new blood. It has come by changed conditions. We have had a large increase in population. We have developed a large amount of oil here. Oil for a great many years sold at $3 a barrel. I was connected with a company for a great many years that bought 30,000 or 40,000 barrels a year at $3 a barrel. I think we figured we had bought 500,000 barrels at that rate. That is not as conducive to low prices as oil at 65 cents a barrel. Many things have changed the situation here, and it may look to the casual observer as if the gas man 15 or 20 years ago was not attending to his business. These things have been welcomed by a great many gas men. Some who have not taken advantage of them have suffered. Mr. Martin's paper is an excellent one and I agree heartily in the main with its sentiments.

Mr. Jones—I rise in defense of the "D. D. and F. S." gas works; the "dirty, dingy and foul smelling" gas works. There was a time when that applied properly; but I think that time has gone and the time has arrived when we try to keep our works in order and everything that is volatile or filthy is used up inside the apparatus instead of being spread about on the ground. I think the general condition of a gas works, as to cleanliness and order, indicates the condition of the business to a large extent. I have always found that where a piece of apparatus is well painted and cared for on the outside, and there are not too many coats of paint over the joints of the manhole plates, the inside of the apparatus is apt to be in the same condition. Regarding reductions in the price of gas, my Eastern experience among directors who feared that reducing the price of gas would reduce the reven ue the amount of gas sold times the reduction (and it was always figured that way) has been that we have never known on account of diminution of revenue that the price of gas has been reduced. The people have appreciated the good work and intent of the gas company; and until the point of saturation—that amount of gas actually needed for lighting and heating and cooking—is reached, we will not notice in our revenue any reasonable reduction in the price of gas.

Mr. Kahn—The subject of consolidatiod deserves a great deal of attention. It is uppermost in the minds of all thinkers. It is with us, and it concerns every man, woman and child living in this or in any other civilized country, and it is well, Mr. Chairman, that your Association should be considering its merits and demerits. Consolidation is with us in all industries and in all branches of human activity. It has commanded the best thought of the best men, and it has given pause to a great many who see in that marvelous development of a new commercial force a great deal of good and a great deal of harm. I am not prepared to discuss at length or in detail the question of consolidation as it may apply to any particular industry, especially if that industry exists in and concerns largely only the Coast of this great Pacific. It is certain, however, that it signifies to me a great deal when I find, after crossing this vast continent of ours from the shores of the Ohio, that this same question is a vital and pressing issue here. It is proof to me that the same conditions which prevail in the East and in the larger centers of population are pressing here with all their strenuous requirements and demands upon the social conditions of your new and great country. The great trouble as I see it with consolidations is not that they are not a benefit, not that the consolidation is not capable of accomplishing that which no individual could accomplish, for these things cannot be gain said. Why, Mr. Chairman, when you analyze the proposition, the government of the United States and every other government are nothing more or less than consolidations. We recognize but one central authority, and the laws of Congress are the laws of and for a consolidation of untold interests. The railroads that cross from the Pacific to the Atlantic, the steamboats that cross the oceans, the railroad bridges and all the great works that challenge the admiration of the world could not have been put into their places and could not render the service that they do to mankind had it not been for combined power and co-operation, which is nothing more or lese than another word for consolidation. The great trouble is that consolidation, as we understand it in the East, has been badly abused. The people who have taken this consolidation in hand have, as a rule, misunderstood the high mission for which they were organized, and by some great mistakes have brought that great

power, that great modern force, into considerable disrepute. It is not because of any inherent defect in the principle, but that they have abused opportunities that should have been turned to far better account in many instances than they have been. The good that may be accomplished is vast, and I need not tell you, Mr. Chairman, that the life and the success and the fair name of consolidations depend, and must necessarily depend, upon the character and the degree of service that they render to the country and to the people. If they will vindicate themselves in that sense, if they will accomplish greater good than the individual has ever been able to accomplish, you can depend upon it that no power on earth can stop the onward march of consolidation in all avenues of acttvity. And in my own opinion, and in the opinion of many people, it is the coming solution of vast problems, none of which is greater than the one so splendidly referred to by our worthy presiding officer when he stated to you the suggestions that were made to him by the President of the South Metropolitan Gas Company of London. I know of no way to solve that problem, the relation of capital and labor, so thoroughly and so well as through just such organization as we are discussing.

The Secretary—I would state to the members that the forms referred to by Mr. Martin are on my desk for your inspection, and will be for your help, I am sure, if you will look them over at your leisure. It seems to me Mr. Martin did not show proper appreciation of the training that has builded him up into the systematic and consolidated man that he is—and we know from his personal appearance that he is very much consolidated. (Laughter.) He came into the Gas Association a stranger in our midst, knowing nothing about gas, except that, from his personal experience, it was expensive to use; and he has heard the members of the Associatson from that time on preach the things he set forth so ably in his paper. I know from my knowledge of the man and the intent of the paper that it was no reflection upon the conduct of the larger companies on the Coast. He spoke of what he saw in his investigation of the smaller gas companies throughout the State. They needed attention badly. They needed consolidation to make money. I do not think more than one in the State was paying dividends even upon its earnings, to say nothing of its capitalization. And it needed some strong, active man with liberal ideas and the education given to him by his alma mater, the Pacific Coast Gas Association, to help these companies out of the slough of coal tar and ashes and dirt into which they had fallen. He has done it and did it well. The smaller gas companies have been put upon their feet and they have plate glass windows and accommodating managers to attract the consumer, who is always represented in towns of that size by the female sex. I think the lesson is one that should be learned by everyone here who represents a gas company. He can take Mr. Martin's word for it, or if he doubts it he can come and see for himself that, as Mr. Jones has said, cleanliness comes before profit, and that profit comes fast and quick if you start it by that sort of method. And our Eastern representatives (I notice Mr. Kahn and Mr. Roper and Mr. Doherty with us) can go back to the Atlantic Coast and take the lesson to the people there of the necessity for maintaining gas works in good condition and of the education along the line of consolidation that has been provided by Mr. Martin from years of experience. That is one of the things the Pacific Coast Gas Association has done; it has educated more men along the lines of the proper running of gas works, proper attention to consumers, and the proper treatment of consumers than any other Gas Association I know of in the world, because it has come to a practical standpoint. It doesn't theorize and it doesn't read papers at length on subjects that are talked over the heads of the average member; it has been a practical educator. That is our aim, and it is going to be our aim to keep it so for all time, to educate the little man, as he feels himself to be in a little works, to know that he is just as big as the biggest man at the biggest works.

Mr. Parker—I was present at the first meeting and listened to the dissertation of Mr. Meyer, but I did not receive quite the impression that Mr. Martin did. Speaking from my own standpoint I endeavored to introduce Welsbachs into Napa, but was unable to, though I wrote to the parent office asking how I could either beg, borrow or steal some lamps. I think some of the works on the Coast did pay particular attention to making their works presentable and also to voluntarily reducing the price of gas; but in small towns it was a long time in developing. In some of the little valleys there was no chance for extensions; but this idea of consolidating interests has shown itself to be a success.

The Secretary—I do not think the statement of Mr. Parker "from his standpipe" ought to be corrected, for the reason that he has always been a pure and simple coal gas man and nothing else. He realizes it. (Laughter.)

Mr. Martin—My reference to the "foul smelling gas works" was applicable to a number of the plants which we purchased, and was the condition prevailing in small gas plants throughout the State. In fact, the paper which I read referred only to the smaller gas companies, no application being made to the larger ones which were selling gas at lower prices. The impression in regard to Welsbachs made upon my mind at the first meeting was that the members were discussing how it would be possible to even pay wages if everybody could use them. I do not know if Mr. Parker was among the number, but a number of the managers of the smaller gas companies were doubtful about introducing Welsbachs. It was merely my thought to indicate to the members generally the change of conditions in this Association. We think about different things to-day. We try to benefit our employers and at the same time very largely benefit the public; the two must go hand in hand to be successful.

Mr. Parker—I remember one remark made by Mr. Osborne, that we all understood how to make gas, but the idea of coming to the Association meetings was to try to find out how to sell it.

Mr. Lowe—I move a vote of thanks to Mr. Martin for his excellent paper. I regret very much indeed that the discussion has not been more extensive. The reason is we all heartily agree with what Mr. Martin has said. [Adopted.]

The President—I will appoint one committee (the balance of the committees will be appointed this afternoon), that on nominations: Messrs. E. C. Jones, H. C. Keyes and T. R. Parker.

The meeting was then adjourned until 2 P.M.

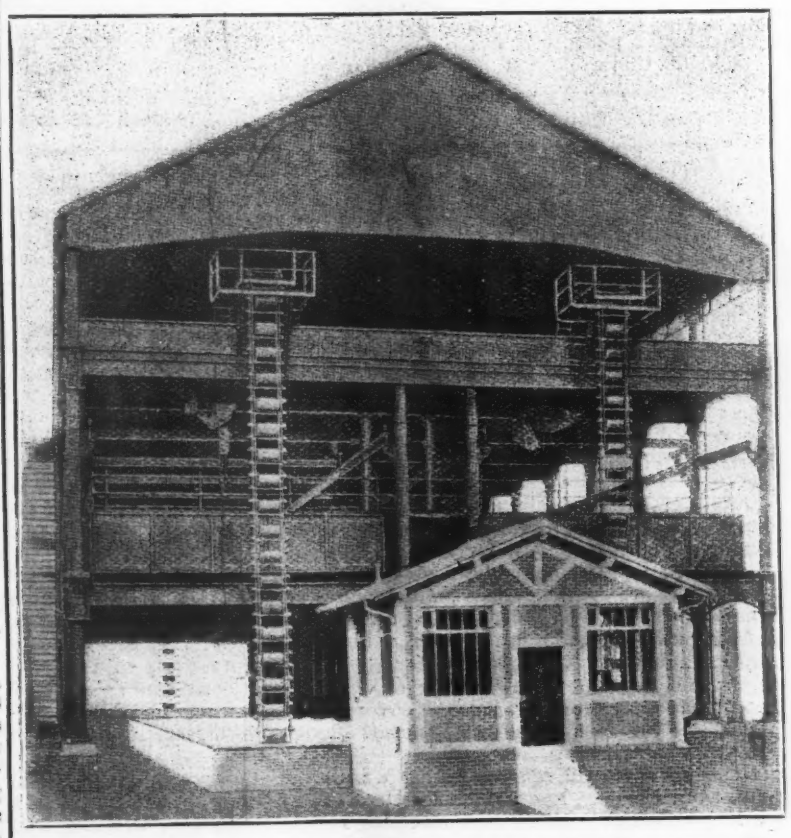
[To be Continued.]

The Purifier House at the Nanterre (France) Gas Works.

The *Journal of Gas Lighting* in describing the purifier house in the Nanterre gas works says that the house is on the stage floor principle, with an oxide revivifying floor above, and the whole of the iron and steel work (with the exception of the bucket conveyors and elevators), including the concrete revivifying floor, was made and erected by the Whessoe Foundry Company, Limited, of London and Darlington.

The overall dimensions of the house are 105 feet by 61 feet 3 inches by 39 feet 3 inches high to the eaves; and it contains 8 purifiers, each 25 feet square by 5 feet deep. These are constructed in two rows of 4 boxes each; each series forming a continuous box 100 feet long by 25 feet wide, and separated by means of three internal division plates. The center gantry is constructed of cast iron perforated plates, supported from the sides of the boxes. It is noticed that the purifiers are of the "dry seal" type; each being provided with one steel cover, 18 feet 6 inches square. The top plates form gangways, and are supported from the inside of the purifiers by means of cast iron standards, which also act as sieve bearer standards. The covers are held in position by means of wing bolts; and the latter, when unscrewed to remove the covers, fall back into a recess formed in the top plates, and are thus protected from injury when not in use. Mentioning the covers, it may be stated there are two overhead travelling cranes for lifting purposes (one over each line of boxes); and these are both manipulated from the purifier stage level.

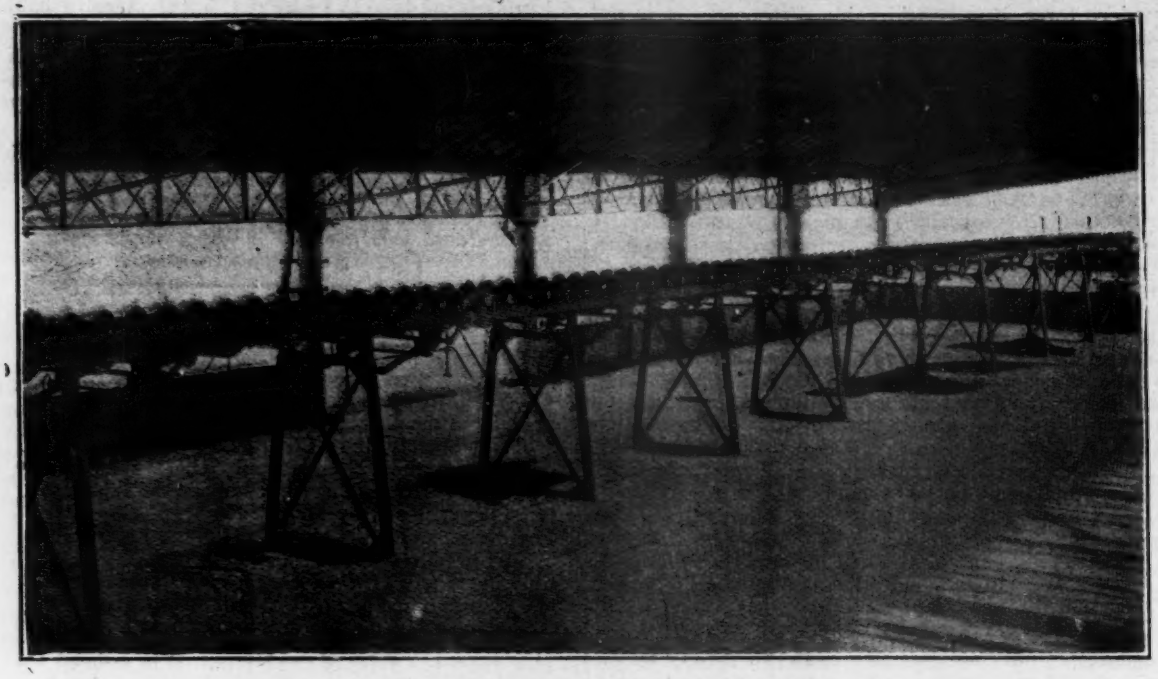
Regarding the arrangements for dealing with the material, provision is made in each box for four tiers of sieves; so that either lime or oxide of iron may be used as desired. The spent material is emptied through shoots in the bottom of the boxes (these shoots being provided at the lower ends with self sealing doors), and falls directly over a conveyor troughing, whence it is fed to a continuous bucket elevator, and is conveyed to any part of the overhead revivifying floor. Two lines of conveyors and elevators (as shown in the illustrations) are used, one for



End View of the Nanterre Purifier House, Showing the Bucket Conveyor.

each series of boxes. The overhead revivifying floor is provided with a number of openings over each purifier, through which the material is fed into the respective boxes by means of canvas shoots. For the protection of this floor, cast iron facia plates, about 2 feet 6 inches high, are fixed all round the sides of the house.

A few words as to the superstructure. It consists of 32 cast iron columns, in four rows of eight each. The two outer rows of columns



View of the Top Floor of the Purifier House, Showing the Conveyor.

are carried up to the eaves level, and support the roof by means of longitudinal lattice girders. The two inner rows of columns are only carried up to the revivifying floor. Both the purifiers and the revivifying floor are supported on stagings formed of main and cross girders of rolled steel joists; the floor itself being constructed of concrete arches, built over the cross girders of the staging. On the side columns of the house, and immediately under the purifiers, are fixed a series of curved lattice girders, which greatly add to the appearance of the structure. The roof is a single span of 61 feet 3 inches, and consists of rafters of latticed members, braced by means of flat steel, and with a system of wind bracing also of flat steel. Access to the purifier and revivifying floors is obtained by a double ornamental staircase on one side of the house. The connections are 24 inches in diameter, and are controlled by means of four 4-way Weck valves, so arranged that the purifiers may be worked in any rotation. As a piece of engineering work, it has been carried out in a manner which, it is believed, will certify for very many years hence the great care exercised by the contractors in its erection. This brings us to the two sets of gravity bucket elevators and conveyors for handling the purifying material, the contract for which was executed by Messrs. Graham, Morton & Co. The gravity bucket conveyor, as every gas engineer knows, is an endless chain of buckets, so hung that the center of gravity is never disturbed. The path of travel is regulated by iron rails, along which flanged wheels, fitted with patent lubricators, run. Along the range of the travel tippers are encountered, which, at regulated intervals, come into contact with cams arranged on the sides of the buckets, and so disturb the center of gravity, by tipping the bucket and allowing the load to fall on to the storing platform. The buckets are fed by a series of revolving feeders situated in the trench through which the train of buckets passes. This revolving feeder is fitted with pug knives—suggesting, by its appearance, the familiar lawn mower. It is arranged to exactly fill each bucket as it passes beneath it. It is impossible to overfeed, or to feed between, the buckets. It is worked by the chain itself, and is, therefore, exactly adjusted to the requirements of the buckets. The predecessor of the gravity bucket conveyor, so far as the Union des Gaz Works are concerned, was the human conveyor: the buckets containing the lime having to be carried or the barrows pushed. The gravity bucket plants have been designed in such a way that if, in the future, it should be found necessary to extend them even to double their present size, the extensions may be made with very little trouble, small expense, and scarcely any alterations.

A more detailed description may be of interest. The tilting-bucket conveyors are 20 inches wide, and each is arranged in such a manner that it carries the oxide from the ground floor, elevates it to the outside of the building, and again carries it horizontally over the second stage floor, eventually tipping the material as required over any of the purifier boxes that may have to be refilled. Each conveyor is supplied complete with structure, gearing coverplates for trenches, ladders, gantries, gas engines in duplicate, and all accessories for starting the plant in proper work as specified.

The conveyors have a total length, including horizontal and vertical runs, of 282 feet. Each consists of a double strand of heavy steel link work, arranged with 4½-inch diameter rollers, supported on axles, and provided with large grease cup lubricators; the axles forming the lubricators being secured to the double strand of chain, and arranged to run on rails, supported on cast iron brackets from off the bottom of the trench or structure. The double strand of chain is tightly stretched over four pairs of drums and axles, two of which are arranged with adjusting screws for regulating the length of the chain. Between the chains are arranged the tilting buckets in such a manner as to swivel on one center; and each bucket is furnished with a tilting cam, secured to the side of the bucket, and placed in position so that, on the tilting mechanism being set, the bucket delivers its load to the desired point. These buckets and cams are attached to the chain with a free-and-easy fit, by means of turned bolts. The driving and trailing drums are of cast iron, provided with renewable steel teeth, each pair of drums being mounted on 4-inch diameter shafts, which are supported in heavy cast iron bearings fitted with brasses. The trailing bearings are provided with means for adjusting them. The rails on which the continuous band of buckets runs are of steel, weighing about 20 pounds per yard, and are securly attached to the cast-iron brackets, which are bolted to the foundations. Guide rails are supplied at the end of the house for guiding the chains in their upward as well as in their downward travel.

Arranged in the trench under the purifier box on each conveyor are 8 revolving feeders—that is 16 feeders for the 2 conveyors—with hoppers. The revolving drum is driven by the chain, and has 4 outlets for the discharge of the material. The cover plates for the trench are of $\frac{5}{16}$-inch steel, and loose plates are also provided over the feeding hoppers. Four ladders afford access from the ground level to the bottom of the trench—that is to say, one is at each end of the conveyor. An additional 4 ladders are also provided for giving access from the top floor level to the driving and trailing ends—one for each end of the conveyors. Gantries are also fixed round the gearing. With regard to the tilting cams provided for each conveyor for tilting the buckets at convenient points, these are supplied with levers for working off the upper stage level.

The requisite gearing for the driving of the conveyors is adjusted in such a manner that the power may be transmitted to the two conveyors either separately or together, from either of the two gas engines, owing to the introduction of a system of clutch gearing and fast-and-loose pulleys, striking gear levers and quadrants. There are 2 gas engines installed; each engine being capable of driving the entire plant, even should extensions be carried out. The engines are arranged side by side, with one self-starter for the two; and each is capable of developing 25-brake horse power, with gas of about 13-candle power.

The contract stipulated that the contractors should so arrange their work as to admit of the purifier house being exactly duplicated in the near future, when, of course, the two lines of bucket conveyors will be extended accordingly. Bearing this in mind, it was suggested that the bucket conveyors should pass centrally over and underneath each line of purifier boxes, and, further, that a suitable size of bucket would be 20 inches.

On the oxide of iron being discharged on to the ground floor from any box, through openings arranged for the purpose, the intention is that it shall be revivified on the ground floor. When the oxide is thus ready for being used again, it is thrown into the buckets of the conveyor and carried along in the trough underneath the ground level, then elevated outside the building and again carried along horizontally over the second stage floor—being tipped, as required, over the purifier box to be refilled.

This account shows the completeness of the purifying house, which, as already observed, is one of the imposing features at the now celebrated Nanterre works.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

THE Spring Valley (N. Y.) authorities have granted a franchise to the Suffern (N. Y.) Gas Company to supply gas in the first named place. The application was made by Mr. Albert H. Kelsall, Manager of the Suffern Company, and the main tenets of the eventual agreement are: The Company is to furnish gas lamps on public account at the rate of $18 each per annum, on moontable schedule, and the rate for gas furnished to private consumers is not to exceed $1.50 per 1,000 cubic feet. The franchise is not to be taxed until 1908, and the main connections between the two points are to be made at once.

THE authorities of Muskogee, Ind. Ter., have granted a franchise to the promotors of the Muskogee Gas and Electric Company. The construction work will be done under the direction of Messrs. H. M. Byllesby & Co., of Chicago.

THE Byllesby Company has also been appointed engineers to the Fort Smith (Ark.) Light and Traction Company. Quite a sum of money has been put up on account of defraying the cost of betterments on the gas and electric plants of this concern.

NEWS from Iowa Falls, Ia., is to the effect that a gas plant for the place is assured by the filing with City Clerk Foster of an acceptance of an ordinance adopted by the City Council. The acceptance was filed by Messrs. W. H. Harrison, Jr,, and W. H. Woods, and it is understood they are the principals in the matter. Under the provisions of the agreement the plant must be installed within 6 months from the date of the franchise, and within 18 months from that date 3½ miles of mains must be in position. The plant is to be situated close to the tracks of the Illinois Central Short Line, and it is expected that gas will be ready for delivery by December 15th.

THE Westchester Lighting Company has applied for a franchise to distribute gas in the town of Tuckahoe, Westchester county, N. Y.

A CORRESPONDENT in Rochester, N. Y., forwards the following under date of the 12th inst.: "A decision has been rendered by the New York Court of Appeals, which will be of interest not only to the residents of Caledonia, but to the people generally who reside in the natural gas section of the State. The litigation is known as the Wilson vs. Tennent case and has been in the court for the past 5 years. It was begun by James G. Wilson to compel James G. Tennent, President of the Caledonia Natural Gas Company, to furnish him, Wilson, with natural gas at 25 cents per 1,000 cubic feet, or pay him a penalty of $10 for the first day and $5 for each succeeding day as provided for in the State laws referring to transport corporations under which manufacturing gas companies do business. The case depended upon whether or not natural gas companies were subject to the same law as manufacturing gas companies. When gas was first found here, a stock company was formed of local men to sell the product. At first they sold gas for 25 cents per 1,000 feet, but soon found that they could not clear expenses at that price, so raised it to 40 cents per 1,000 feet. This act on the part of the company met with a great deal of opposition and the following named citizens began action against the company to compel them to furnish gas at the first price: James A. Wilson, A. H. Collins, D. D. McColl, Edward Peister and E. P. Brownell. Three of these cases were dropped before coming to trial, the other two were decided against the plaintiffs by default. Soon after this the gas plant was sold at sheriff's sale and was bid in by Mr. Tennent, the biggest stockholder, who then formed the present company. On January 4, 1899, Edward Peister and A. H. Collins made application for gas at the original price. They were refused and two months later a test suit was begun in the name of James A. Wilson to compel Mr. Tennent to pay $310 damages, Mr. Wilson claiming that he was within 100 feet of the mains and was entitled to gas at the price named in the franchise. George D. Forsyth, of Rochester, represented Mr. Wilson and the case came to trial in the Supreme Court before Hon. John M. Davy, at Geneseo, Nov. 14, 1899. Judge Davy gave a decision the gist of which appeared at the time in the newspapers and was to the effect that natural gas companies were not amenable to that provision of the statute, which compelled manufacturing gas companies to give gas to any applicant who complied with certain requirements from the fact that the product of natural gas companies was not under the control of the producer. Mr. Wilson was not satisfied with this, but appealed his case to the Appellate Division. where Judge Davy's decision was sustained. Not yet satisfied, Mr. Wilson took the matter to the Court of Appeals, where a unanimous decision was rendered in favor of Mr. Tennent and sustained the previous decisions. The decision will attract considerable attention from the fact that it is the first ever rendered on a case of this kind, and will mean much to natural gas companies operating where the supply may be limited."

WE understand that Messrs. A. W. G. McAllister, W. J. Henderson, W. G. Mitchell, Geo. E. Clark and G. H. Semple, have applied for letters incorporating a gas company which proposes to operate in Montreal, Can. It is capitalized in $1,000,000.

CONSTRUCTION work on the plant at Pen Argyl, Pa., is virtually underway. Mr. A M. Sutherland is the constructor.

THE authorities of Savannah, Ga., are proposing to adopt an ordinance providing for the inspection of gas and electric meters. The local gas and electric lighting suppliers are not opposed in any sense to the adoption of such a measure, if its terms are at all fair.

IT looks that the Public Service Corporation, of New Jersey, will soon acquire control of the properties of the Perth Amboy Gas Company, which concern has been controlled by Senator John Kean for several years. The Company's mains extend to the districts of Woodbridge and Sewaren.

THE Rector Gas Lamp Investment Company, with headquarters in Stamford, Conn., has been incorporated. It is capitalized in $5,000.

THE properties of the Wyandotte Gas Company, of Bethlehem, Pa., were sold at trustees' sale, at noon of the 11th inst. The purchasers were Messrs. H. A. Fuller and H. W. Denning, of Wilkes-Barre, Pa., who represented the interests of the bondholders.

AT the annual meeting of the shareholders in the Brockton (Mass.) Gas Light Company, no change was made in its executive management.

MR. A. F. KERSTING will be retained as Manager of the Florence (Ala.) Gas Light and Fuel Company, the purchase of which by Messrs. Geist and Kelsey was reported by us some time ago.

THE authorities of San Antonio, Tex., are contemplating the placing on the streets of quite a number of Welsbach lamps. They will replace arc and incandescent electric lamps.

THE organization of the National Gas Company, which proposes to supply gas in Elgin, Ills., has been completed, as follows: Directors, Ira C. Copley, T. H. Day and C. C. Smith, all of Aurora, Ills.; President, T. H. Day; Secretary, C. C. Smith.

A CORRESPONDENT in Duluth, Minn., writing under date of the 10th inst., says: "Since the gas generated in the coke ovens of the Zenith Furnace Company at West Duluth, has been turned into the city mains, complaints have been received by the Gas and Water Board that the quality of the gas furnished by the city has greatly deteriorated and that it smokes when used with ordinary burners without the Welsbach attachment. Manager L. N. Case of the Water Board said yesterday that while this is true in a degree, it is due to the fact that the adjustment of the West Duluth plant has not yet been perfected. A new attachment is soon to be added, which, it is believed, will remedy the difficulty. The gas at present is entirely suitable for cooking purposes, and when arrangements have been completed it will be quite as good as the old gas for Welsbach burners, though it will probably not equal it when burned with the ordinary tip. The trouble now is said to be caused by the fact that the gas is turned directly into the mains instead of being stored. When the new coal has been piled into the coke ovens, there is a rush of gas to the mains which subsides again as the material burns out. A tank which will insure a uniform flow to the mains is what the department is seeking to install."

THE general programme for the International Engineering Congress to be held in St. Louis, Mo., October 3 to 8, under the auspices of the American Society of Civil Engineers, is now being distributed to the members. It contains the names of the members of the committee in charge, under the chairmanship of Henry S. Haines, and the chairmen of the eight sections, Waterways, Municipal, Railroads, Materials of Construction, Mechanical, Electrical, Military and Naval and Miscellaneous, as well as an outline of the work to be done. The chairman of the congress will be Charles Hermany, President of the American Society of Civil Engineers, and the Secretary, Charles W. Hunt. All the meetings will be opened at 10 A.M. Monday and Saturday will be general meetings of the Congress, and the intermediate days meetings of all sections. The general meetings will be held in Convention Hall, Administration Building, and the section meetings in separate rooms of the same building or its vicinity. Eminent engineers from all parts of the world will contribute to the value of this gathering, 108 papers having been promised. Those which will be of special interest will probably be found in the Materials of Construction, Mechanical and Miscellaneous sections, the subjects treated being manufacture of steel, manufacture of cement, concrete and concrete-steel and tests of materials of construction (steel, timber and cement), purification of water for the production of steam, turbines and water wheels, locomotives and other rolling stock, passenger elevators, pumping machinery, steam turbines and mining engineering.

THE AMERICAN GAS LIGHT JOURNAL

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NOTIFICATION RESPECTING ADVERTISING.

Orders for new advertising, or for changes in standing advertisements, to insure attention in the issue following their reception, must be in hand any time of Wednesday.

AGENTS:
New York—American News Co., 39 and 41 Chambers St.
Germany—Lemcke & Buechner, of New York.
England—Aug. Siegle, 30 Lime Street, London.

MONDAY, AUGUST 22, 1904.

The Market for Gas Securities.

Some business was transacted in Consolidated in the last six days, but the fluctuations or changes were slight. The closing rates to-day (Friday) were 195¾ to 196¼. Those who are owners of the Company's shares might do well to take a trip to Astoria and there view in the daylight where much of their money is being put in the construction of a gas plant which, for magnitude and modern methods, will in the end be the best in the world. Those who are doubters without an examination will be believers after one.

In the outside market there is not much to report. Brooklyn Union is nominally 213 to 220, and Peoples, of Chicago, holds steady at 101. Baltimore Consolidated shows no change, but rumor hath it that the Brady end won't pay the price. Very well; let them get into another situation like unto that which prevails in Brooklyn. Cincinnati holds well to its recent advance, and the Pepper receivership agreement seems to put Bay State, of Delaware, out-of-court altogether.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

AUGUST 22.

☞All communications will receive particular attention.

☞The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	195¾	196¼
Central Union, Bonds, 5's.	3,000,000	1,000	106½	106¾
Equitable Bonds, 6's	1,000,000	1,000	105	..
" 1st Con. 5's	2,300,000	1,000	118	120
Metropolitan	658,000	..	108	112
Mutual	3,500,000	100	270	300
Municipal Bonds	750,000	..	..	..
New Amsterdam Gas Co.				
Bonds, 5's	11,000,000	1,000	107½	109
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	35	..
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	..	..	..
Northern Union, Bonds, 5's.	1,250,000	1,000	102½	105½
New York and East River..				
Bonds 1st 5's	3,500,000	1,000	111	113
" 1st Con. 5's	1,500,000	..	106	108
Standard	5,000,000	100	125	13
Preferred	5,000,000	100	145	155
Bonds, 1st Mortgage, 5's	1,500,000	1,000	116	117
Yonkers	299.650	500	180	..
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	213	220
" " Bonds (5's)	15 000,000	1,000	113	115
Bay State	50,000,000	50	—	—
" Income Bonds	2,000,000	1,000	..	75
Binghamton Gas Works	450,000	100	28	30
" 1st Mtg. 5's	509,000	1,000	93	96
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	3¾	4
" " Bonds, 5's	5,250,000	1,000	12¾	.
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Cincinnati Gas and Electric Co	29,500,000	100	103	103¼
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	97½	99
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	88¼	89½
Preferred	3,026,500	100	107½	109
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	79	79¼
Mortgage, 6's	3,600,000	..	..	118
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N.J.	1,000,000	100	15	17
" Con. Mtg. 5's	880,000	1,000	86	90
Consolidated G. & E. Co.'s.				
Little Falls, N.Y.	90,000	100	..	100
Bonds	75,000	..	..	100
Detroit City Gas Co	4,825,500	50	..	50
" Prior Lien 5's	5,603,000	1,000	99½	100
Detroit Gas Co., 5's	981,000	1,000	75	75¼
" Inc. 5's	16,000	100	98½	100
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	39	40
Fort Wayne	2,000,000	..	..	..
" Bonds	2,000,000	..	55	..
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	..	67	68
" Bonds, 5's	10,500,000	..	103½	104½
Indianapolis	2,000,000	..	60	70
" Bonds, 6's	2,650,000	..	103½	106½
Jackson Gas Co	250,000	50	73	75
" 1st Mtg. 5's	290,000	1,000	101	102½
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	..	..
Preferred	2,500,000	100	75	100
Bonds	10,000,000	1,000	109½	110
Lafayette Gas Co., Ind.	1,000,000	100	..	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	136	140
Madison Gas & Elec. Co. " 1st Mtg. 6's	350,000	1,000	107½	108¼
" 6 per cent. scrip, due 1910	100,000	25	85	87
Montreal, Canada	2,000,000	100	218	218¾
Nashville Gas Lt. Co.	1,000,000	100	110	..
Newark, N. J., Con. Gas Co.	6,000,000	..	56	58
Bonds, 6's	4,600,000	..	105	105¾
New Haven	1,000,000	25	64	70
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	100⅞	101
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
2d "	2,500,000	1,000	104	.
Rochester Gas & Elec. Co.	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	87½	90
San Francisco, Cal.	15,800,000	100	58½	55¾
St. Joseph Gas Co. " 1st Mtg. 5's	751,000	1,000	92	96½
St. Paul Gas Light Co	1,500,000	100	45	47
1st Mortgage 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	2,465,000	1,000	92	93
Syracuse, N. Y.	1,975,000	100	46	48
Bonds	2,047.000	1,000	94	96
Washington, D. C	2,600,000	20	287½	288¾
First mortgage 6's	600,000	..	..	..
Western, Milwaukee	4,000,000	..	..	..
Wilmington, Del.	600.000	50	230	..

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SUPERINTENDENT.

Correspondence solicited with owners of gas plants (coal or water), in city of 10,000 or over, who wish to secure the services of a competent superintendent. Single man, 31 years of age; 10 years' practical experience in manufacture, distribution and sale of gas. Thoroughly competent on construction work and accounting. References from former and present employers. Member Western and Ohio Associations.

1523-5 Address, "M.," care this Journal.

Position Wanted.

YOUNG MAN, thoroughly experienced in all the branches of the gas business. Understands manufacture and economical operation generally; also the business and office management. Excellent references from past and present employers. Salary contingent upon results actually obtained. Address, "R.,"

1523-3 Care this Journal.

WANTED,
GAS FOREMAN,

In growing town. Must understand coal and water gas manufacture. Salary, $75 per month, which will be increased if services are satisfactory.

1524-3 Address, "A. D. A.," care this Journal.

WANTED,

By a gas construction company, engineer and designer of coal gas works. Must be able to do detail work and have practical experience in designing machinery. State experience and salary wanted; give age, and if able to speak foreign languages, state so.

Address, "B. C. F.,"

1524-tf Care this Journal.

WANTED,

An Experienced Gas Man with Some Capital,

To invest in a gas plant in one of the best towns in Colorado. He would be expected to take the management of the business. Preference given to one who thinks it necessary to come West for the benefit of his or family's health.

1524-2 Address, "COLORADO," care this Journal.

WANTED,

Springer Water Gas Apparatus.

Shell must be 6 feet diameter, or larger. State condition and price.

Address, W. H. GRAFFIS,

1523-2 1362 Monadnock Bldg., Chicago, Ills.

WANTED, AN EXHAUSTER.

A Second-Hand Roots Steam-Jet Exhauster,

Eight-inch connections, complete and in good order. Address, MARGARET PIERCE,

1520-tf Secretary, Springfield, Ills.

FOR SALE.

ONE SET OF FOUR PURIFIERS,

Sixteen feet by 12 feet by 4½ feet deep each; 12-inch connections, centerseal, two sets trays and all fittings complete as when in use. These purifiers are in first-class condition, and for all practical purposes are as good as new. Our sole reason for disposing of them is that they are too small for our output. They will be sold at a very low figure, and delivery can be made at once. We would be glad to show these boxes to anyone interested. Address,

ATLANTIC CITY GAS AND WATER COMPANY,

1523-4 Atlantic City, N. J.

FOR SALE.

Lot of second-hand

THREE-LIGHT METERS,

in splendid condition; as good as new. Also one

NINE-FOOT STATION METER,

with a capacity of 1,000,000 cubic feet per 24 hours. Address, "VINDEX,"

1508-tf Care this Journal

FOR SALE.

Three Davis & Farnum Purifiers,

Twelve feet by 24 feet by 4 feet. Also,

One 50-Horse Power Bigelow Boiler.

All in good condition. Address,

PAWTUCKET GAS COMPANY,

1522-4 PAWTUCKET, R. I.

TO BE SOLD AT FORECLOSURE,

Property, Business and Franchises of the Consolidated Gas and Electric Company, of Batavia, N. Y.,

On Monday, August 29th, 1904, at 11 o'clock, A.M., at the Court Houe, in the village of Batavia, N. Y.

1523-2

FOR SALE.

ONE 11-FOOT STATION METER,

With 3-partition, Parkinson drum, in good condition and repair. . .

Address,

MINNEAPOLIS GAS LIGHT COMPANY,

1523-4 MINNEAPOLIS, MINN

FOR SALE.

One Section Wrought Iron Hydraulic Main, with Stiness tar take-off, for 3 benches of 6's.
One Section Main, for 4 benches of 6's.
Standpipes, Bridgepipes, Mouthpieces with Self-sealing Lids, for 7 benches of 6's.
One Sinuous Friction Condenser.
One Walker Tar Extractor.
Four Purifiers, 10 by 16 by 3; complete. Connections above apparatus, 10-inch.
One 50 Horizontal Return Tubular Boiler.

All of the above apparatus is in good condition, and to be sold, as the Company has been obliged to purchase larger for its new works. Address, TAUNTON GAS LIGHT CO.,

1522-6 Taunton, Mass.

FOR SALE.

Four Purifiers, 24 feet by 21 feet by 3 feet 1 inch; 18-inch cup; 20-inch centerseal.
Two Floor Carriages, vertical screws; boxes arranged for 3 layers of trays. Boxes originally set in square, 22 feet Supporting columns and I-beams also on hand.
Four Purifiers, 30 feet by 21 feet by 3 feet 1 inch; 18-inch cup; 20-inch centerseal.
Two Floor Carriages, one with hydraulic lift, one with vertical screw. Supporting columns and I-beams also on hand.
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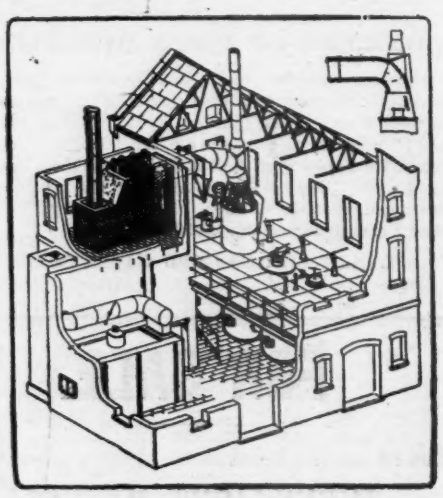

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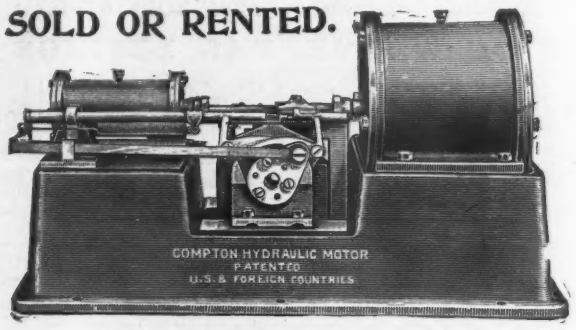

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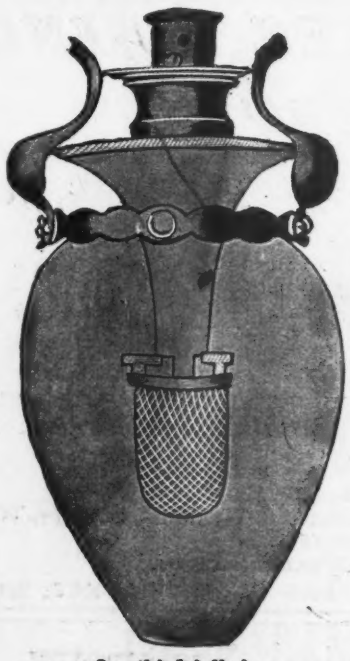

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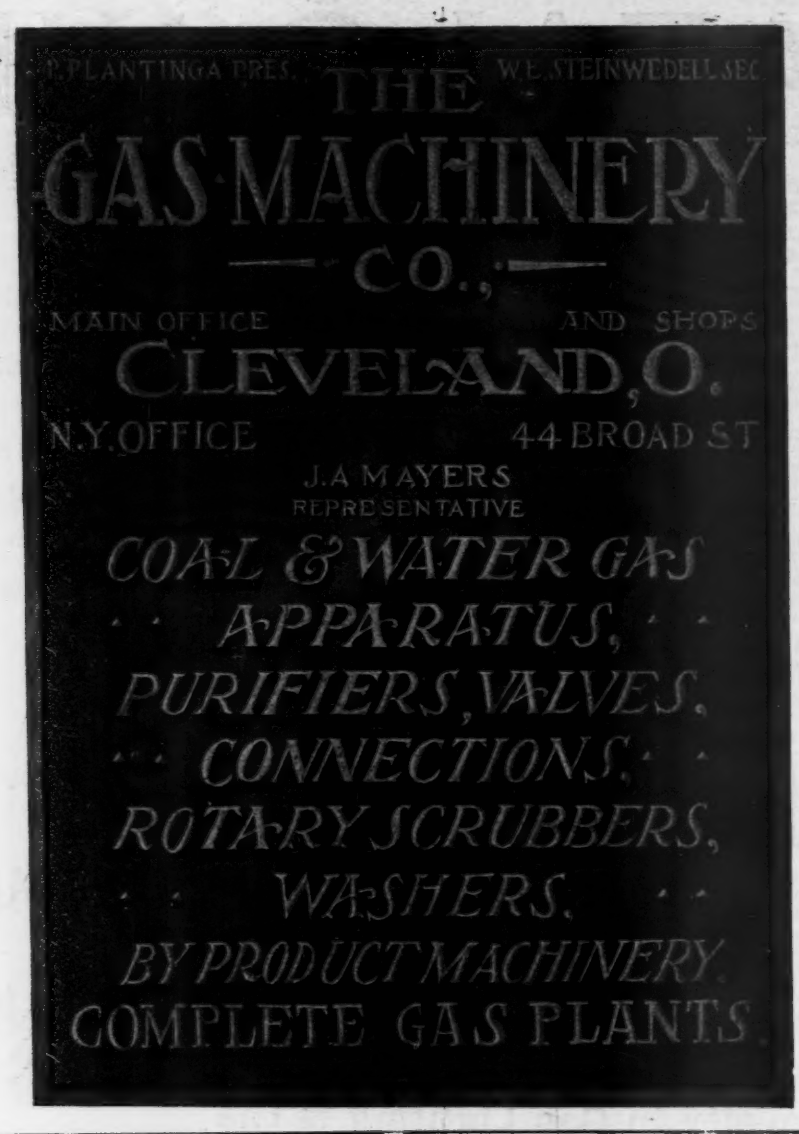

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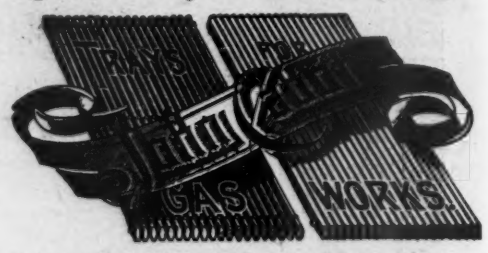

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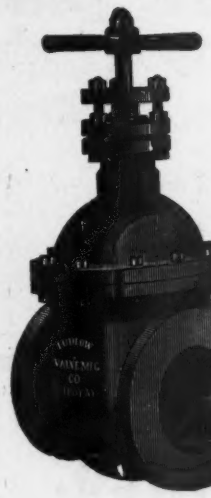

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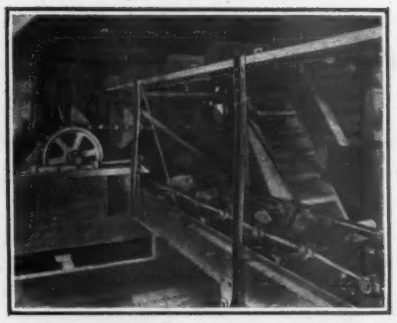

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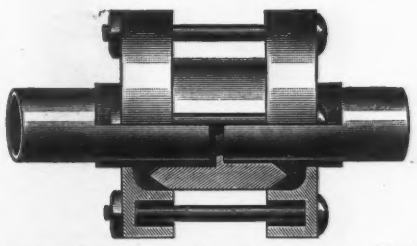

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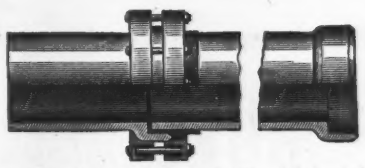

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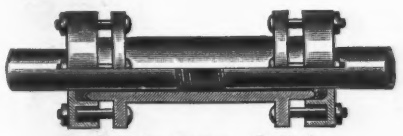

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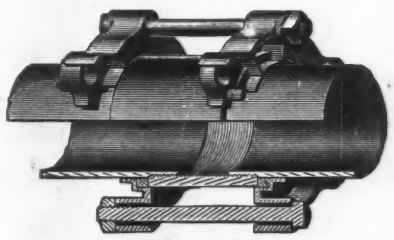

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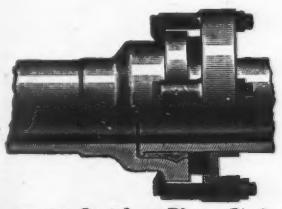

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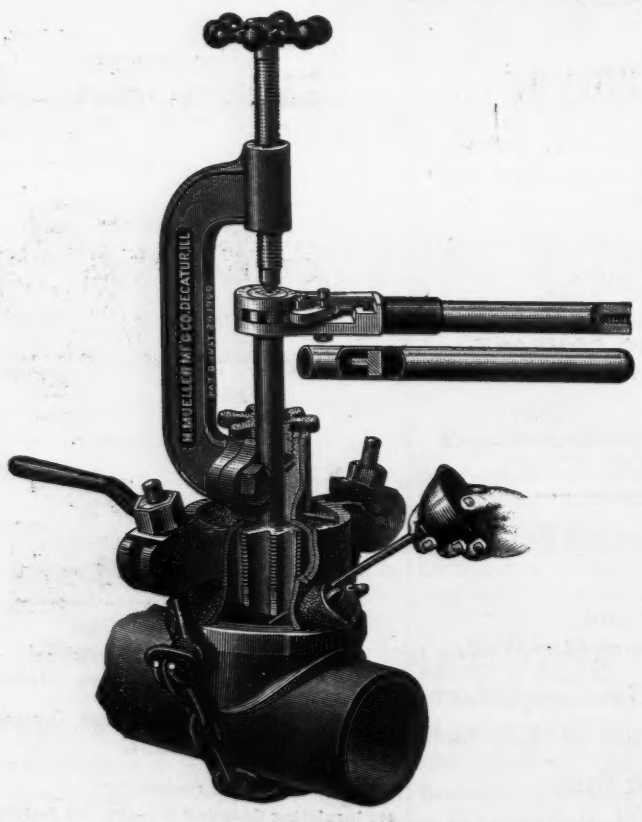

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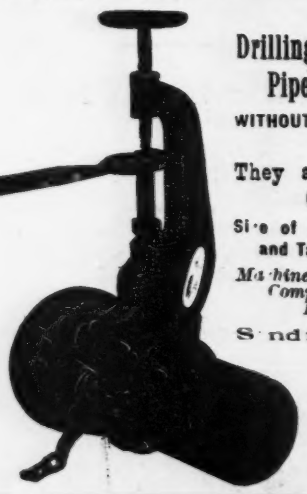

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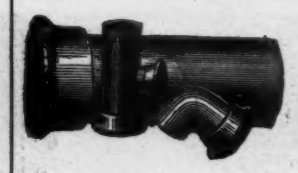

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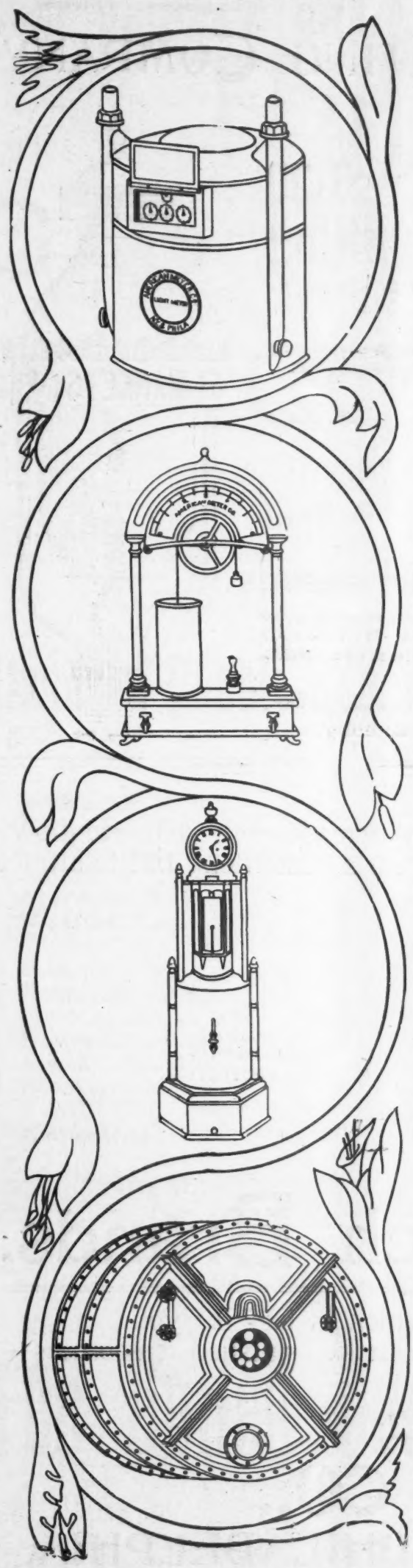

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CHICAGO,
ST. LOUIS,
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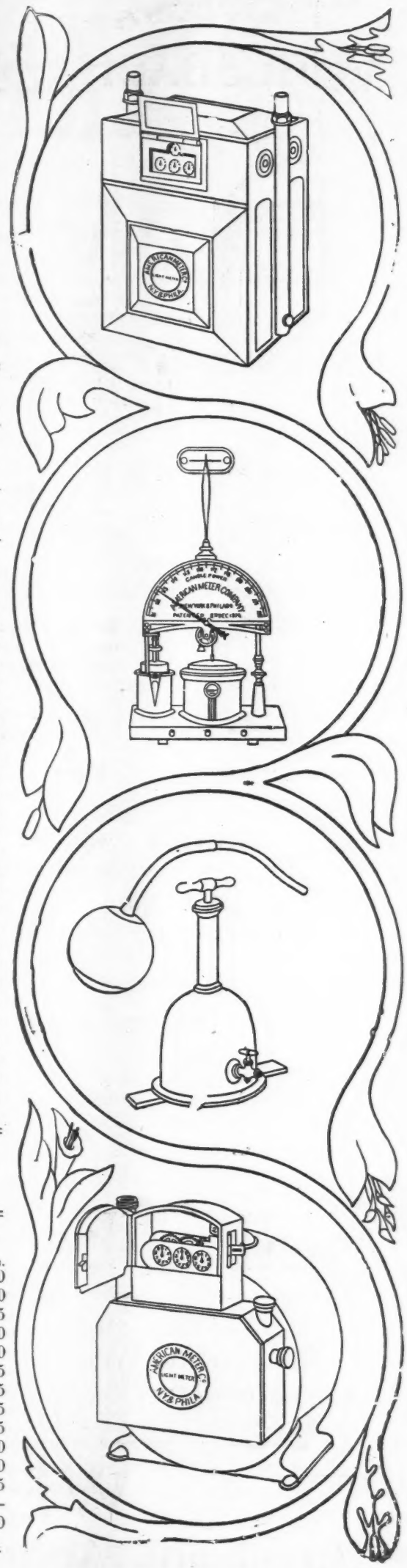
PUBLIC LIGHTING TABLE.

SEPTEMBER, 1904.

Day of Week.	Table No. 1. Following the Moon. Date.	Light.	Extinguish.	Table No. 2. New York City. All Night Lighting. Light.	Extinguish.
				P.M.	A.M.
Thu.	1	7.00 PM	11.10 PM	6.30	4.20
Fri.	2	7.00 LQ	11.50	6.30	4.20
Sat.	3	7.00	12.40 AM	6.15	4.30
Sun.	4	6.50	1.30	6.15	4.30
Mon.	5	6.50	2.40	6.15	4.30
Tue.	6	6.50	4.30	6.15	4.30
Wed.	7	6.50	4.30	6.15	4.30
Thu.	8	6.50	4.30	6.15	4.30
Fri.	9	6.50 NM	4.30	6.15	4.30
Sat.	10	6.50	4.30	6.05	4.40
Sun.	11	6.40	4.40	6.05	4.40
Mon.	12	6.40	4.40	6.05	4.40
Tue.	13	6.40	4.40	6.05	4.40
Wed.	14	8.40	4.40	6.05	4.40
Thu.	15	9.20	4.40	6.05	4.40
Fri.	16	10.10 FQ	4.40	6.05	4.40
Sat.	17	11.00	4.40	5.55	4.50
Sun.	18	12.00	4.50	5.55	4.50
Mon.	19	12.50 AM	4.50	5.55	4.50
Tue.	20	1.50	4.50	5.55	4.50
Wed.	21	2.40	4.50	5.55	4.50
Thu.	22	3.40	4.50	5.55	4.50
Fri.	23	No L.	No L.	5.55	4.50
Sat.	24	No L. FM	No L.	5.40	5.00
Sun.	25	No L.	No L.	5.40	5.00
Mon.	26	6.20 PM	8.00 PM	5.40	5.00
Tue.	27	6.20	8.30	5.40	5.00
Wed.	28	6.20	9.10	5.40	5.00
Thu.	29	6.20	9.50	5.40	5.00
Fri.	30	6.20	10.40	5.40	5.00

TOTAL HOURS LIGHTING DURING 1904.

By Table No. 1.	Hrs.Min.	By Table No. 2.	Hrs.Min.
January	225.00	January	423.20
February	205.40	February	367.40
March	187.40	March	355.35
April	169.50	April	298.50
May	152.30	May	264.50
June	137.20	June	234.25
July	138.50	July	243.45
August	151.00	August	280.25
September	164.40	September	321.15
October	191.30	October	374.30
November	210.30	November	401.40
December	237.10	December	433.45
Total, yr.	2171.40	Total, yr.	4000.00



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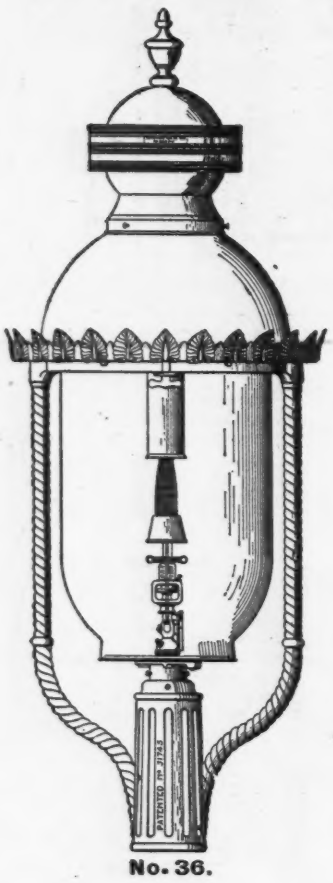

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Chicago, Ills.	Newark, N. J.	Cicero, Ills.
Amesbury, Mass.	Washington, D. C.	Chicago (Ogden Co.)
Aberdeen, S. D.	Boone, Ia.	Easton, Pa.
Winsted, Conn.	Pueblo, Col.	Lawrence, Mass.
Canon City, Col.	Charlotte, N. C.	Council Bluffs, Ia.
Schenectady, N. Y.	Fall River, Mass.	Chattanooga, Tenn.
Hagerstown, Md.	Duluth, Minn.	Tuckerton, N. J.
Malden, Mass.	New York (Mutual Co.)	Springfield, O.
Bridgeport, Conn.	Waltham, Mass.	Easton, Pa. (2d contract).
Albert Lea, Minn.	Dover, Del.	Mobile, Ala.
Brooklyn, N. Y.	York, Pa.	Conshohocken, Pa.
Kansas City, Kas.	Minneapolis, Minn.	Mason City, Ia.
Hempstead, N. Y.	Allentown, Pa.	

TOTAL SETS FOR 1903, ... 62
TOTAL DAILY CAPACITY, ... 62,950,000 cubic feet.
TOTAL SETS TO DATE, ... 508
TOTAL DAILY CAPACITY, ... 362,780,000 cubic feet.

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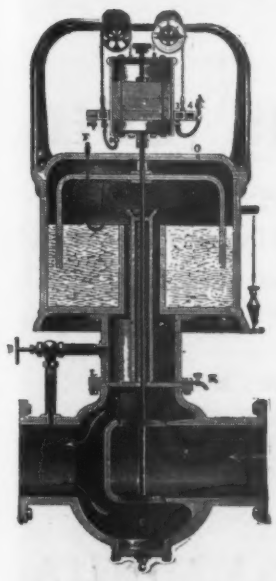

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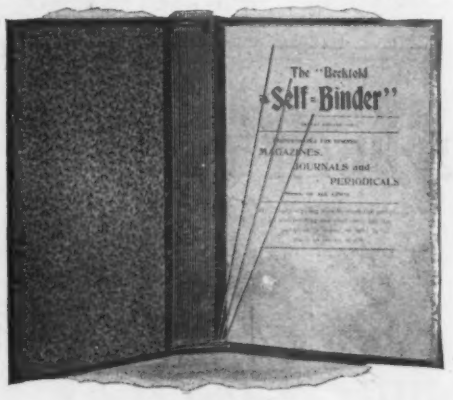

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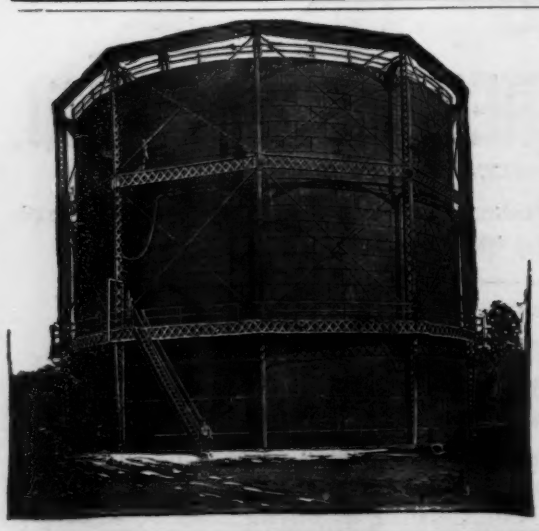

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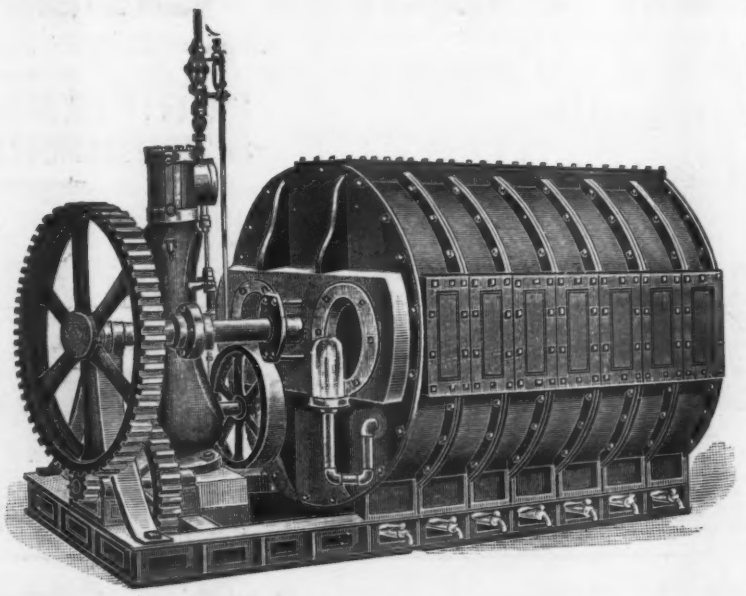

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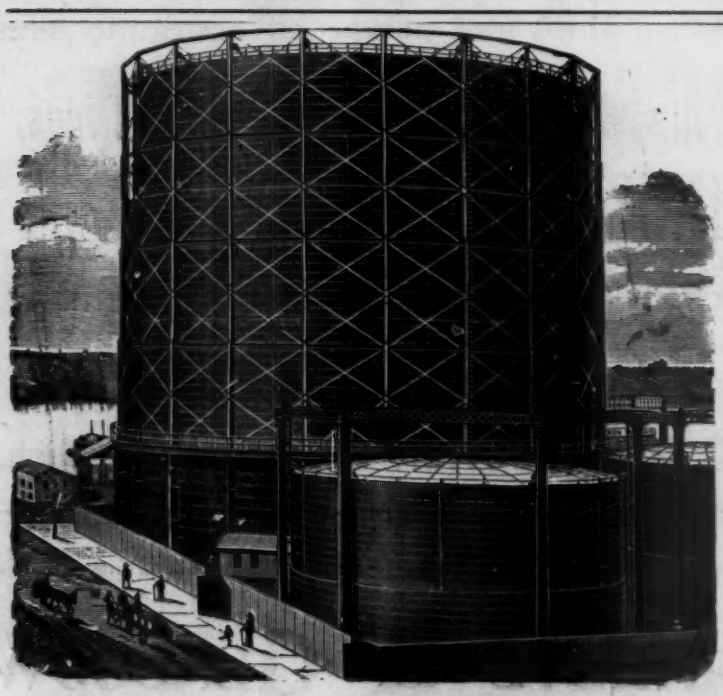

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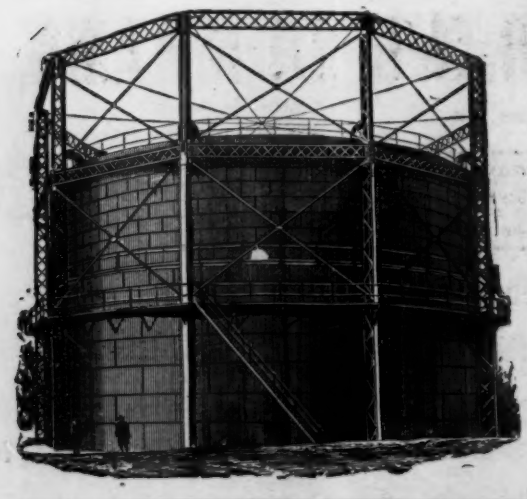

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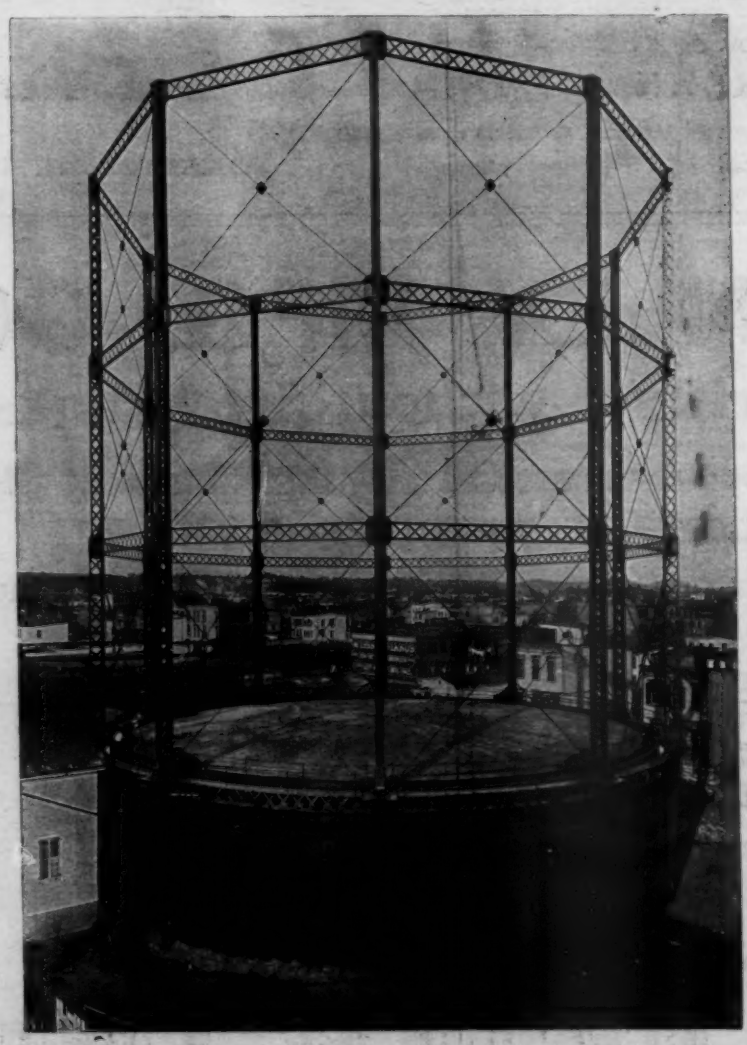

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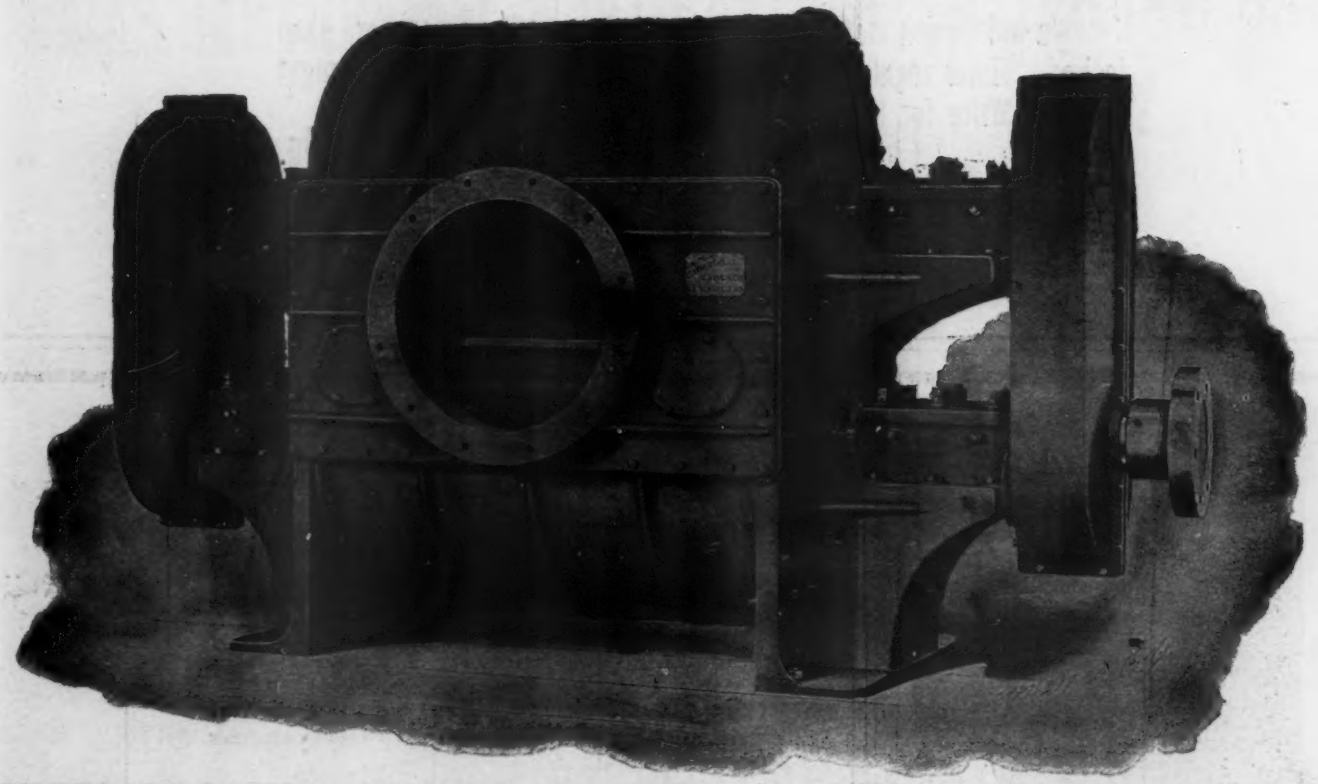

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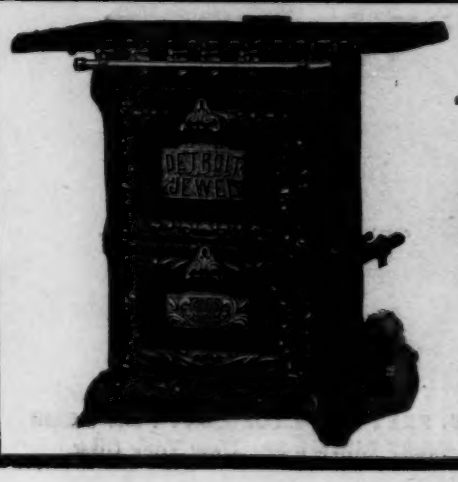

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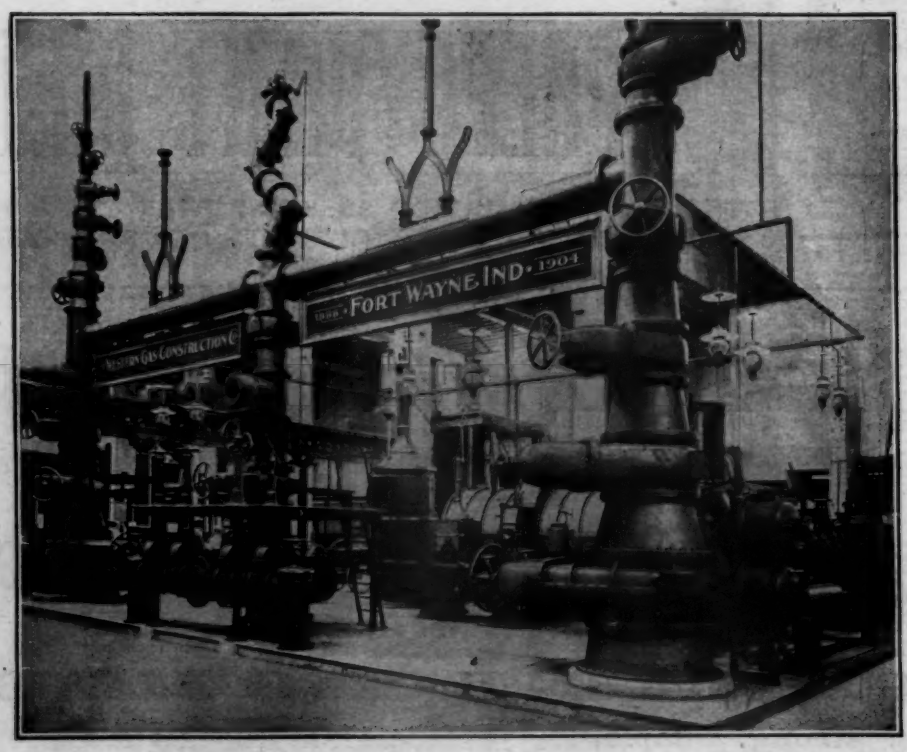

Section 15A.

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